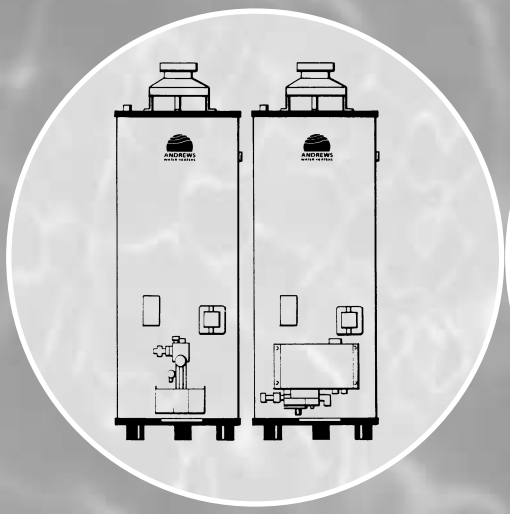
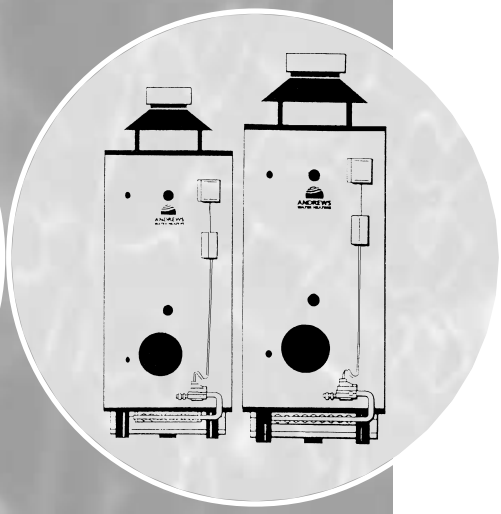
ANDREWS
WATER HEATERS





# INSTALLATION GUIDE, OPERATION AND SERVICE MANUAL

## PROPANE & BUTANE GAS FIRED STORAGE WATER HEATERS

**HI-FLO RANGE**
Models
L32/143, L65/169,
L81/251, L62/309,
L54/399,
Permanent Pilot,
Piezo Ignition
'E'/'F' Series

**STANDARD RANGE**
Models
L24/31, L32/35, L40/36,
L63/71, L84/74
Permanent Pilot,
Auto Ignition 'G' Series

THIS MANUAL MUST BE KEPT WITH THE APPLIANCE

October 2004 Part No. E133

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ANDREWS
WATER HEATERS

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Andrews Storage Water Heaters have been designed and manufactured to comply with current International standards of safety. In the interests of the health and safety of personnel and the continued safe, reliable operation of the equipment, safe working practices must be employed at all times. The attention of U.K. users is drawn to their responsibilities under the Health and Safety Regulations 1993.

All installation and service on the Andrews Water Heater must be carried out by properly qualified personnel, and therefore no liability can be accepted for any damage or malfunction caused as a result of intervention by unauthorised personnel.

The Andrews Water Heaters policy is one of continuous product improvement, and therefore the information in this manual, whilst completely up to date at the time of publication, may be subject to revision without prior notice.

Further information and assistance can be obtained from:

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Website: www.andrewswaterheaters.co.uk

**THE ANDREWS WATER HEATERS COVERED IN THIS MANUAL ARE FOR USE WITH PROPANE AND BUTANE GASES ONLY**

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## GENERAL INFORMATION

The Andrews Water Heater has been designed for use with PROPANE or BUTANE GAS only and is manufactured to give an efficient, reliable and long service life.

To ensure the continued, trouble-free operation of your heater at maximum efficiency, it is essential that correct installation, commissioning, operation and service procedures are carried out strictly in accordance with the instructions given in this manual. By law, installation and commissioning of the heater must be carried out by properly qualified personnel.

The heater(s) must be installed in accordance with the following requirements;
The current GAS SAFETY (INSTALLATION AND USE) REGULATIONS
The current BUILDING REGULATIONS
The Water Supply (WATER FITTINGS) REGULATIONS 1999

Additionally, installation should be performed in accordance with all relevant requirements of the Gas Supplier, Local Authority and recommendations of the British Standards and Codes of Practice detailed below.

## BRITISH STANDARDS AND CODES OF PRACTICE

### STANDARD RANGE

| | |
|---|---|
| BS 6700: 1997 | Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages. This standard supersedes the following British Standards and Codes of Practice: CP99, CP310, CP324, 202, CP342 Part 2, Centralised Hot Water Supply. |
| BS 5440 | Installation of flues and ventilation for gas appliances of rated output not exceeding 60kW. |
| Part 1:2000 | Specification for installation of flues. |
| Part 2:1989 | Specification for installation of ventilation for gas appliances. |
| BS 5546:1990 | Installation of gas hot water supplies for domestic purposes. |
| BS 6891 | Installation of low pressure gas pipework of up to 28mm in domestic premises. |
| BS 7206:1990 | Specification for unvented hot water storage units and packages. |
| I/M2 | Purging procedures for non-domestic gas installations. |
| I/M5 | Soundness testing procedures for industrial and commercial gas installations. |
| I/M11 | Flues for commercial and industrial gas fired boilers and air heaters. |
| I/M16 | Notes on installation of gas pipework (excluding 25mm and below). |

### Hi-Flo RANGE

As STANDARD RANGE plus:

| | |
|---|---|
| BS 6644: | Installation of gas fired hot water boilers of rated inputs between 60kW and 2MW. |
| IGE/UP/10 Pt.1 Edition 2 | Installation of Gas Appliances in Industrial and Commercial Premises |

**NOTE:** **Consideration should be given to amendments or updates to the above standards.**

## HEALTH AND SAFETY REGULATIONS 1993

It is the duty of manufacturers and suppliers of products for use at work to ensure, so far as is practicable, that such products are safe and without risk to health when properly used and to make available to users, adequate information about their safe and proper operation.

Andrews Water Heaters should only be used in the manner and purpose for which they were intended and in accordance with the instructions in this manual. Although the heaters have been manufactured with paramount consideration to safety, certain basic precautions specified in this manual must be taken by the user.

It is imperative that all users of the heater must be provided with all the information and instruction necessary to ensure correct and safe operation.

---

## EFFECTIVENESS IN COMBATING LEGIONELLAE

Water systems in buildings have been associated with outbreaks of Legionnaires' Disease, particularly in health care facilities where occupants are significantly more susceptible to infection.

In recognition of the risks in hospitals, a Code of Practice for the Control of Legionellae in Health Care premises has been issued by the Department of Health (1991). Codes of Practice applicable to other premises have been published by other organisations, principally the Health and Safety Executive (HS)(G70) and the Chartered Institute of Building Services Engineers (CIBSE, TM13).

All Codes of Practice draw attention to the design and operation of water systems with reference to avoidance of factors that favour colonisation by Legionellae bacteria. These factors include stagnation, lukewarm conditions (20°C to 45°C) and the accumulation of debris, scale and corrosion in the base of tanks and calorifiers.

Andrews Water Heaters has commissioned an independent evaluation of their products to investigate their resistance to build-up of legionellae bacteria.

Experiments were conducted to determine whether, following a substantial challenge by legionellae pneumophilia, after overnight and stagnation conditions, the system was rendered free from viable recoverable legionellae. It was found that at 61°C, following a challenge of approximately 107 organisms per litre, within one hour, more than 99.999% of organisms had been killed. After a subsequent stagnation period, sampling did not reveal any residual contamination. The design of the base of the water heater precludes legionellae colonisation, even after build-up of debris. The burner positioning ensures that the water at the bottom of the heater reaches the same, or higher temperature as in the rest of the heater.

Based on data obtained through experiment, the Andrews Water Heater can be described as legionellae resistant as it is considered unlikely that, at the temperature tested, the organism would colonise the water heater and present a possible health risk.

## STANDARD RANGE

| ANDREWS MODEL NO. | | L24/31 | L32/35 | L40/36 | L63/71 | L84/74 |
|---|---|---|---|---|---|---|
| Storage Capacity | l<br>gal | 109<br>24 | 145<br>32 | 182<br>40 | 286<br>63 | 382<br>84 |
| Recovery thro' 44ºC/80ºF | l/h<br>gal/h | 141<br>31 | 163<br>35 | 163<br>36 | 322<br>71 | 336<br>74 |
| Recovery thro' 56ºC/100ºF | l/h<br>gal/h | 113<br>25 | 127<br>28 | 131<br>29 | 258<br>57 | 269<br>59 |
| Heat Input Gross | kW<br>Btu/h | 9.5<br>32,414 | 11.0<br>37,532 | 11.0<br>37,532 | 22.0<br>75,064 | 22.0<br>75,064 |
| Heat Input Net | kW<br>Btu/h | 8.6<br>29,343 | 10<br>34,120 | 10<br>34,120 | 20<br>68,240 | 20<br>68,240 |
| Gas | | LPG CAT $I_3$ | | | | |
| Inlet Gas Pressure Propane | mbar<br>ins wg. | 37<br>14.86 | 37<br>14.86 | 37<br>14.86 | 37<br>14.86 | 37<br>14.86 |
| Inlet Gas Pressure Butane | mbar<br>ins wg. | 28<br>11.26 | 28<br>11.26 | 28<br>11.26 | 28<br>11.26 | 28<br>11.26 |
| Gas Flow Rate | $m^3/h$<br>$ft^3/h$ | 0.36<br>12.74 | 0.41<br>14.64 | 0.41<br>14.64 | 0.83<br>29.28 | 0.83<br>29.28 |
| Gas Connection | Rc (in BSP Int) | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 |
| Flue Gas Temp | ºC | 180 | 180 | 185 | 125 | 130 |
| Flue Gas Volume | $m^3/h$ | 16 | 16 | 23 | 28 | 34 |
| Gas Injector Orifice Diameter | mm<br>in | 1.5<br>0.059 | 1.6<br>0.063 | 1.6<br>0.063 | 2.25<br>0.089 | 2.25<br>0.089 |
| Flue Size (Secondary) | mm<br>in | 100<br>4 | 100<br>4 | 100<br>4 | 125<br>5 | 125<br>5 |
| Cold Water Feed Connection | R (in BSP/Exl) | 1 | 1 | 1 | 1 | 11/4 |
| Hot Water Flow Connection | R (in BSP/Exl) | 1 | 1 | 1 | 1 | 11/4 |
| *Return Connection | Rp (in BSP/Int) | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 |
| Drain Port Size | R (in BSP/Ext) | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 |
| Max. Working Pressure | bar<br>$lbf/in^2$ | 10<br>150 | 10<br>150 | 10<br>150 | 10<br>150 | 10<br>150 |
| Max. Test Pressure | bar<br>$lbf/in^2$ | 20<br>300 | 20<br>300 | 20<br>300 | 20<br>300 | 20<br>300 |
| Weight Empty | kg<br>lb | 43<br>94 | 57<br>126 | 65<br>144 | 110<br>244 | 181<br>400 |
| Weight Full | kg<br>lb | 151<br>334 | 202<br>446 | 247<br>544 | 396<br>874 | 562<br>1240 |
| Shipping Weight | kg<br>lb | 44<br>98 | 59<br>131 | 68<br>150 | 120<br>264 | 194<br>428 |
| Shipping Dimensions Depth | mm<br>in | 546<br>211/2 | 587<br>231/8 | 587<br>231/8 | 692<br>271/4 | 914<br>36 |
| Shipping Dimensions Width | mm<br>in | 486<br>19 1/8 | 537<br>21 1/8 | 537<br>21 1/8 | 651<br>25 5/8 | 762<br>30 |
| Shipping Dimensions Height | mm<br>in | 1194<br>47 | 1245<br>49 | 1499<br>59 | 1575<br>62 | 1829<br>72 |

## Hi-Flo RANGE

| ANDREWS MODEL NO. | | L32/143 | L65/169 | L81/251 | L62/309 | L54/399 |
|---|---|---|---|---|---|---|
| Storage Capacity | l<br>gal | 145<br>32 | 295<br>65 | 386<br>81 | 282<br>62 | 245<br>54 |
| Recovery thro' 44°C/80°F | l/h<br>gal/h | 649<br>143 | 788<br>169 | 1140<br>251 | 1403<br>309 | 1821<br>399 |
| Recovery thro' 56°C/100°F | l/h<br>gal/h | 517<br>114 | 613<br>135 | 913<br>201 | 1122<br>247 | 1449<br>319 |
| Recovery thro' 72°C/130°F | l/h<br>gal/h | 399<br>88 | 472<br>104 | 699<br>154 | 862<br>190 | 1117<br>246 |
| Heat Input Gross | kW<br>Btu/h | 41.8<br>142.622 | 49<br>167,188 | 76<br>259,312 | 92.5<br>315,610 | 122<br>416,264 |
| Heat Input Net | kW<br>Btu/h | 38<br>129,656 | 44<br>150,128 | 69<br>235,428 | 84<br>286,608 | 111<br>378,732 |
| Gas | | LPG CAT $I_3$ | | | | |
| Inlet Gas Pressure Propane | mbar<br>ins wg. | 37<br>14.86 | 37<br>14.86 | 37<br>14.86 | 37<br>14.86 | 37<br>14.86 |
| Butane | mbar<br>ins wg. | 28<br>11.26 | 28<br>11.26 | 28<br>11.26 | 28<br>11.26 | 28<br>11.26 |
| Gas Flow Rate Propane | $m^3/h$<br>$ft^3/h$ | 1.61<br>57 | 1.89<br>66.87 | 2.93<br>103.7 | 3.58<br>126.25 | 4.71<br>166.50 |
| Gas Flow Rate Butane | $m^3/h$<br>$ft^3/h$ | 1.26<br>44.6 | 1.48<br>52.24 | 2.29<br>81.04 | 2.79<br>98.63 | 3.68<br>130.08 |
| Gas Connection | Rc (in BSP Int) | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 |
| Flue Gas Temp | °C | 125 | 125 | 170 | 190 | 170 |
| Flue Gas Volume | $m^3/h$ | 57 | 67 | 104 | 126 | 167 |
| Gas Injector Orifice Diameter | mm<br>in | 1.60<br>0.063 | 1.70<br>0.067 | 1.85<br>0.073 | 1.78<br>0.070 | 1.78<br>0070 |
| Flue Size (Secondary) | mm<br>in | 150<br>6 | 150<br>6 | 200<br>8 | 200<br>8 | 250<br>10 |
| Cold Water Feed Connection | R (in BSP/Exl) | 11/2 | 11/2 | 11/2 | 11/2 | 11/2 |
| Hot Water Flow Connection | R (in BSP/Exl) | 11/2 | 11/2 | 11/2 | 11/2 | 11/2 |
| *Return Connection | Rp (in BSP/Int) | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 |
| Drain Port Size | R (in BSP/Ext) | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 |
| Max. Working Pressure | bar<br>$lbf/in^2$ | 10.3<br>150 | 10.3<br>150 | 10.3<br>150 | 10.3<br>150 | 10.3<br>150 |
| Max. Test Pressure | bar<br>$lbf/in^2$ | 20<br>300 | 20<br>300 | 20<br>300 | 20<br>300 | 20<br>300 |
| Weight Empty | kg<br>lb | 190<br>419 | 200<br>441 | 289<br>687 | 294<br>515 | 269<br>594 |
| Weight Full | kg<br>lb | 335<br>738 | 488<br>1091 | 656<br>1447 | 618<br>1135 | 514<br>1134 |
| Shipping Weight | kg<br>lb | 199<br>438 | 230<br>492 | 316<br>697 | 287<br>566 | 293<br>645 |
| Shipping Dimensions Depth | mm<br>in | 902<br>35 1/2 | 914<br>36 | 914<br>36 | 914<br>36 | 914<br>36 |
| Shipping Dimensions Width | mm<br>in | 768<br>30 1/4 | 762<br>30 | 762<br>30 | 762<br>30 | 762<br>30 |
| Shipping Dimensions Height | mm<br>in | 1270<br>50 | 1960<br>77 | 2210<br>87 | 1960<br>77 | 1960<br>77 |

* If the water heater is to be used on an unvented system, the combined temperature/ pressure relief valve must be fitted directly into the tank. The secondary return is then connected to the drain port via a suitable tee.

## INTRODUCTION

**THE LAW REQUIRES THAT INSTALLATION IS CARRIED OUT BY A PROPERLY QUALIFIED PERSON**

Installations must be carried out in accordance with Gas safety (Installation and Use) Regulations 1998, Building Regulations, The Water Supply (Water Fittings) Regulations 1999 and any requirements of the local Gas Authority, Local Authority, Water and Fire Authorities and the current British Standards and Codes of Practice listed in Section 1.

**The fittings pack supplied with the heater contains the items listed below.**

1 - Installation and Service Manual.
1 - Coupler Socket ¾in BSP.
1 - Gas Cock.
1 - Drain Cock.
1 - Flue Adaptor Socket (Where required).
2 - Cap End 1½in BSP (Hi-Flo only).
2 - 1½in x 3in Nipples (L32/143 Model only).
1 - Warranty Card.

## ASSEMBLING THE DRAUGHT DIVERTER

The draught diverter must be assembled with the legs provided.
Attach the legs to the draught diverter with the nuts and bolts provided. Fit the draught diverter (1) as shown in Fig.1 to the water heater using the screws provided.
For Standard Range fit the draught diverter to the top of the water heater using the location holes.

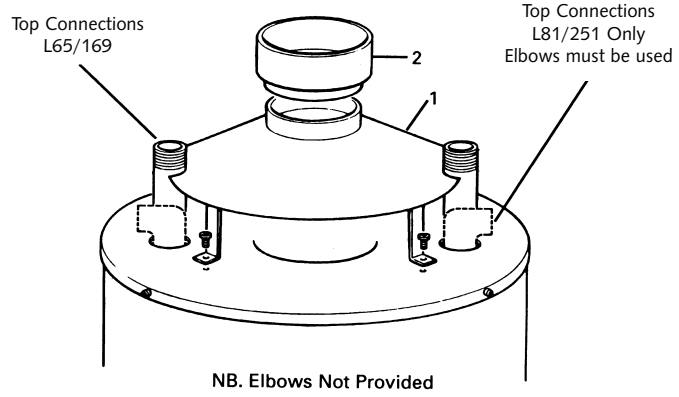



**Fig. 1**
**Draught Diverter Assembly**

In some cases, it may be necessary to drill the fixing holes in the top cover to fit the draught diverter to the water heater. By using the draught diverter as a template, position carefully over the flueway and mark the hole positions to be drilled 4mm.

Fit the adaptor socket (2) and caulk into the draught diverter as shown in Fig. 1.

## LOCATION

The location selected for installation of the heater must allow the provision of a satisfactory flue, adequate air supply, drain facilities and must be well illuminated.

A purpose built boiler room or compartment is strongly recommended.

A manual valve for isolation of the boiler room should be installed in the gas supply; it should be clearly identified and readily accessible for use at all times.

If a purpose built boiler room is not available, measures should be taken to protect the heater from damage and prevent any extraneous matter from being stored on or around the heater.
See BS 6644 Clauses 4, 5 and 6 for details.

## LOCATION

The heater must not be installed in any location which contains a bed, bath or shower.
The heater must not be installed in a basement or cellar.
There must be easy access to the boiler room and heater at all times.

A clearance of 800mm (31½ in) for Hi-Flo and 300mm for Standard Range should be left at the front of the heater for removal of the burner.

Clearances at the sides and rear of the heater should be at least 305mm (12in).

Service clearances for removal of the anodes and flue baffles should be provided as detailed below. Note! Where restricted headroom is a problem, articulated anodes can be supplied. Andrews Part No. C333.

**STANDARD RANGE**

| | |
|---|---|
| Models L24/31, L32/35, L40/36 | 762mm (30 in) |
| Model L63/71 | 1143mm (45 in) |
| Model L84/71 | 1270mm (50 in) |

**HI-FLO RANGE**

| | |
|---|---|
| Model L32/143 | 597mm (23½ in) |
| Model L81/251 | 1300mm (52 in) |
| Models L65/169, L62/309, L54/399 | 1143mm (45 in) |

The floor on which the heater is installed must be non-combustible, flat, level and of sufficient strength to withstand the weight of the heater filled with water (see Section 2, Technical Data) and should satisfy the requirements of the Local Authority and Building Regulations.

NOTE:
If the heater is in an exposed position and out of use during a period of heavy frost, it is recommended that the whole system is drained down to prevent damage due to the formation of ice inside the storage vessel.

## GAS SUPPLY

**THE ANDREWS WATER HEATERS COVERED IN THIS MANUAL MUST ONLY BE USED WITH PROPANE OR BUTANE GAS.**

Contact Calor Gas who will provide the appropriate type and size of LPG supply vessel and ensure it's safe location and installation.

The installation of the gas supply must conform to LPGA Code of Practice, 22 LPG Piping Systems: Design and Installation plus the requirements of British Standards and Codes of Practice listed in Section 1 of this manual.

Andrews water heaters are unregulated and a second stage regulator must be installed to give an inlet pressure to the appliance as follows:

PROPANE: 37mbar (14.86 in wg)
BUTANE: 28mbar (11.26 in wg)

**Gas Supply Cock, Standard Models**

Fit the gas supply cock immediately upstream of the gas control thermostat using a suitable jointing compound and connect to the gas supply. Do not apply heat in close proximity to the gas thermostat as damage to the control will result. A pressure test point nipple is fitted to the gas control thermostat at the gas inlet to test the incoming gas pressure.

## GAS SUPPLY

**Gas Supply Cock, Hi-Flo Models**

Fig 2.
Fit the gas cock immediately upstream of the gas control valve using a suitable jointing compound and connect to the gas supply. An inlet nipple complete with pressure test point nipple is factory fitted to the gas control valve to avoid possible damage.

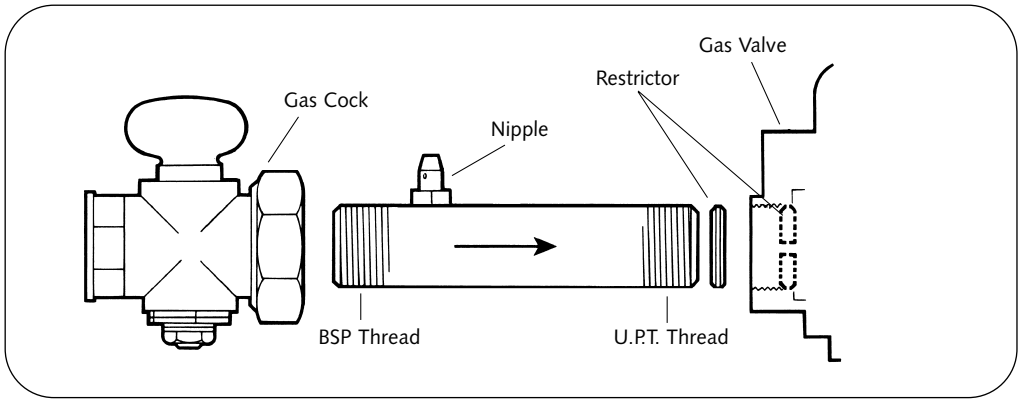



**Fig 2.**

Where the water heater(s) is(are) installed in a boiler house or purpose built compartment, a manually operated valve for the boiler house must be fitted in accordance with the Gas Safety (Installation and Use) Regulations 1998. The valve must be easily identified and readily accessible.

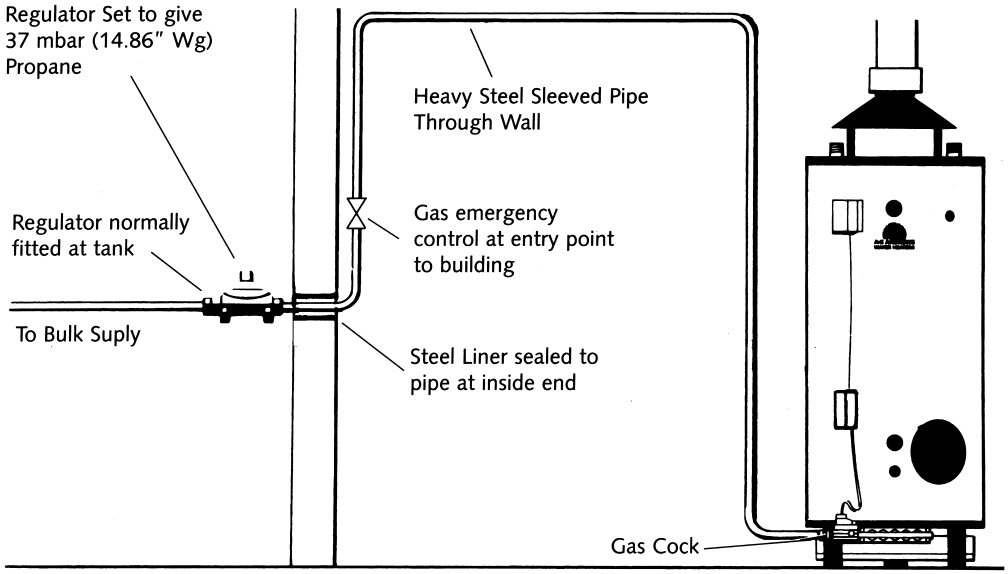
After installation, the system should be pressure tested for soundness and purged in accordance with BS 6891 or IM/2 and IM/5 as appropriate.

## INSTALLATION OF THE LPG SUPPLY

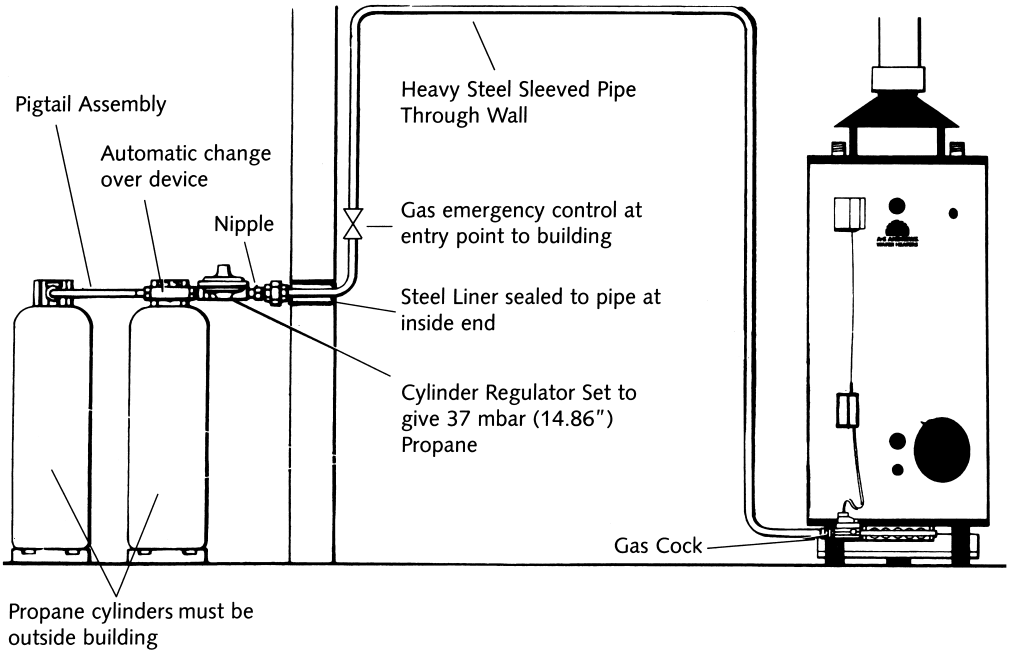
Fig. 3
When using propane or butane cylinders connect a minimum number of cylinders as listed below, together with a manifold before connecting to the union.
Use a minimum pipe size of 3/4 in bore.

| | |
|---|---|
| One cylinder | All Standard Range Models |
| Two cylinders | Hi Flo Models L32/143, L65/169, L81/251 |
| Three cylinders | Hi Flo Model L62/309 |
| Four cylinders | Hi Flo Model L54/399 |

**WARNING!**
**PROPANE AND BUTANE CYLINDERS MUST BE USED AND STORED IN ACCORDANCE WITH 'THE HIGHLY FLAMMABLE LIQUIDS AND LIQUIFIED PETROLEUM GASES REGULATIONS 1972', AND SHOULD COMPLY WITH LPGA CODE OF PRACTICE 7, 'STORAGE OF FULL AND EMPTY LPG CYLINDERS AND CARTRIDGES.**




**Bulk Storage Vessel Installation**




**Cylinder Installation**

**Fig 3.**

## ELECTRICAL SUPPLY- AUTO IGNITION UNIT

### STANDARD RANGE MODELS

External wiring to the water heater(s) must be installed in accordance with current I.E.E. Regulations for the wiring of buildings and to any Local Regulations that may apply.

The Auto Ignition Heater is designed to operate from a 220/240V, 1Phase supply. The fuse rating is 5 amps.

The method of connection to the mains electricity supply should facilitate complete electrical isolation of the appliance, preferably by use of an unswitched shuttered socket outlet in conjunction with a fused three pin plug, both complying with the requirements of BS 1363.

Alternatively, a fused double pole switch or fused spur box serving only the heater may be used.

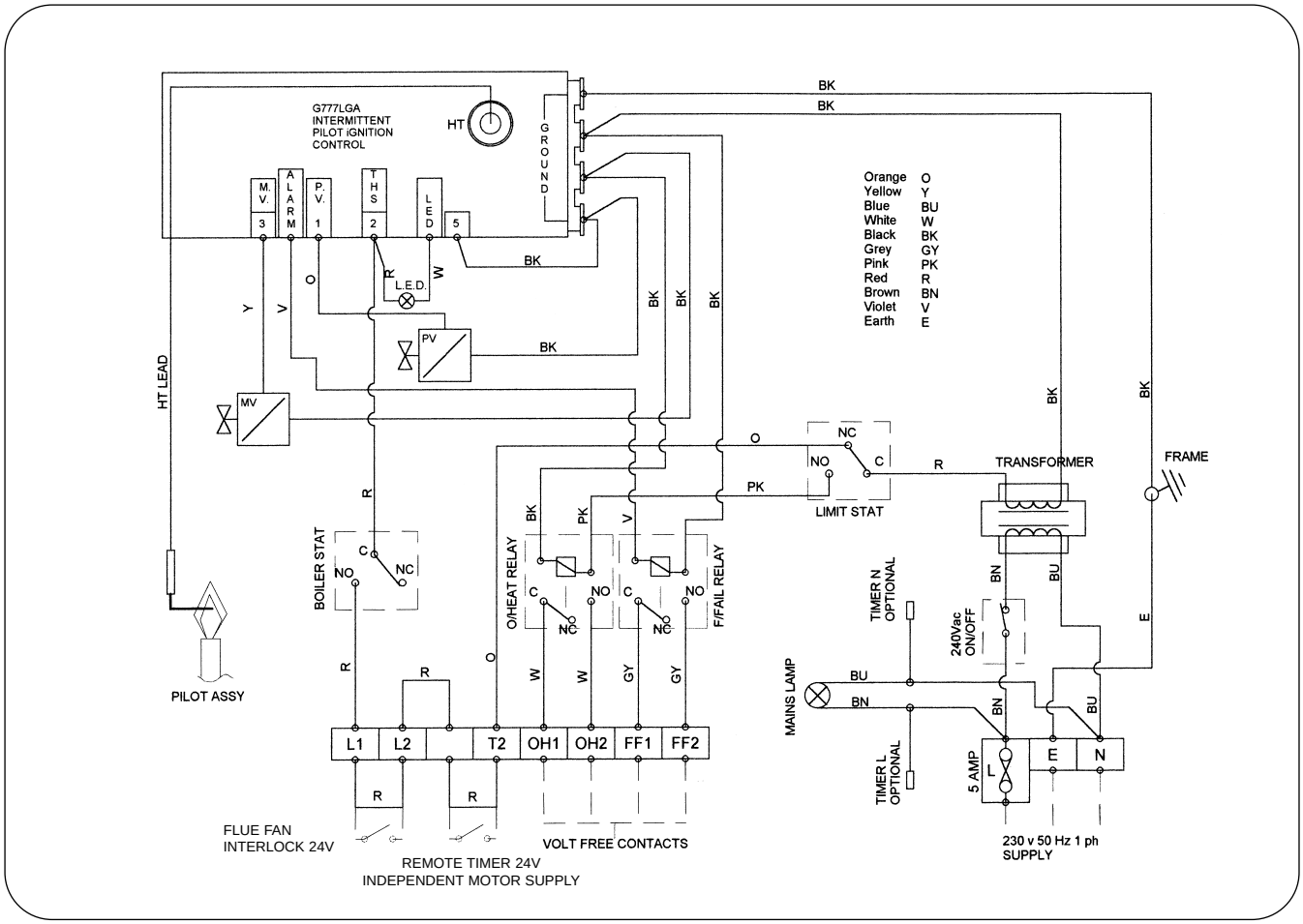
The point of connection to the mains electricity supply should be readily accessible and adjacent to the appliance.

Fig 4.
Connect the electrical supply to the main control panel terminal block via the cable glands in the base of the control panel. Mains input cable should be 0.75mm$^2$, 3 core, and should be connected to the mains supply as detailed above.

It is recommended that screen cable is used where the volt-free contacts are to be connected from an external supply. This will eliminate the risk of possible interference from nearby high voltage cables.

A separate data sheet is available for Automatic Ignition Control System. Contact Andrews Water Heaters.

**Fig 4.**



## FLUE SYSTEMS

Detailed recommendations for flue installation are given in BS 6644, BS5440 Pt 1 and British Gas publication IM/11 - Flues for Commercial and Industrial Gas Fired Boilers and Air Heaters. See also IGE/UP/10 Pt1.

The flue connection is designed for BS 835 type heavy duty flue, but light quality flue pipe, mild steel or stainless steel sheet may be used using the appropriate adapter. Flue pipes etc. shall be fitted socket-up to keep any condensate within flue and appliance. Flues up to 200mm (8in) diameter should be fitted with a suitable British Gas Certified terminal.

Fig 5a.
The terminal position is most important and must be at least 1000mm (40in) above roof surfaces or at least 600mm (24in) above any parapet and clear of any adjacent obstruction as well as being clear of any openable windows, ventilators or features which could allow re-entry of flue products into the building. Pressure areas should also be avoided to prevent blowdown. See recommendations in BS 6644 and IGE/UP10Pt1. BS 5440 Part 1 also provides useful additional advice.

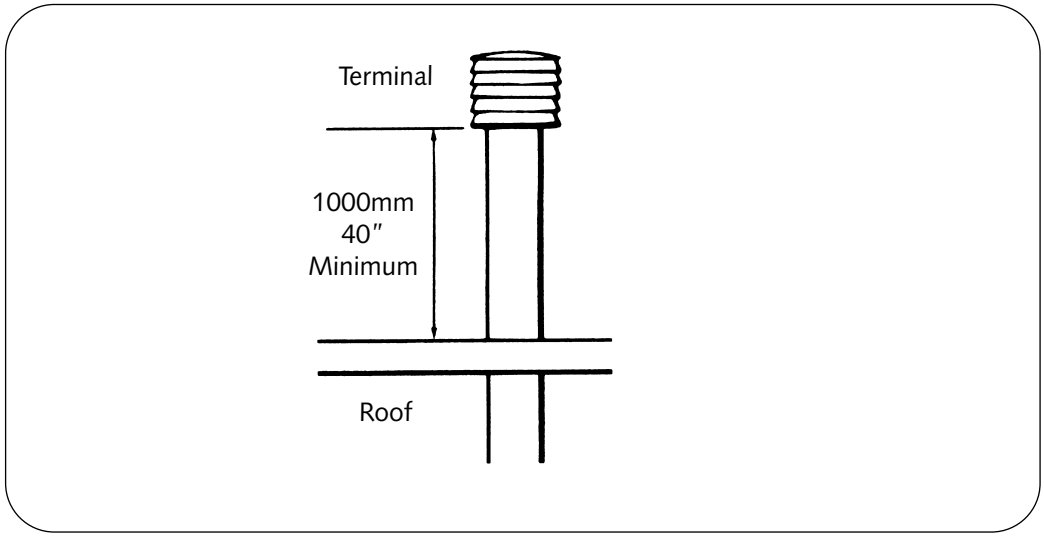



**Fig 5a. Terminal**

Flue materials, including jointing materials and fittings shall be asbestos-free, robust, durable, corrosion resistant and non-combustible and shall comply with BS 5854 and BS 715 or BS 4076 as appropriate, as well as being of a type accepted by the Local Gas Authority.

When passing up through or adjacent to combustible materials, measures shall be taken to prevent the temperature of the combustible material from exceeding 60°C (150°F). The flue shall not be closer than 50mm (2in) to any combustible material except when passing through, when it must be enclosed by a non-combustible sleeve and separated from the sleeve by not less than 25mm (1in) air space.

Flues shall be of a size not less than specified in Section 2, Technical Data (i.e. nominal flue size) and fitted so that there is no risk to persons in the building or from accidental damage.

Fig 5b.
If using an existing brick chimney, it should be swept and checked for soundness before connecting the flue and should take the shortest possible route and rise continuously to the terminal avoiding the use of 90° bends where a change of direction is required. Horizontal and very shallow runs of flue should be avoided since they impede the flow of gases and increase local cooling.

## FLUE SYSTEMS

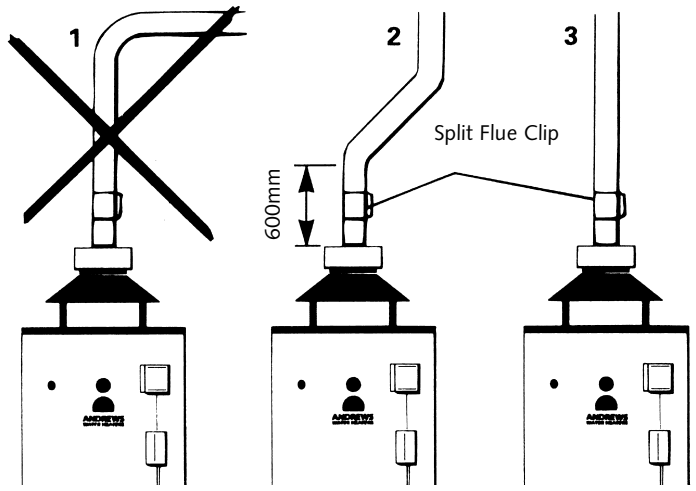



**Fig 5b.**

*A minimum of 600mm of vertical flue directly above the draught diverter should be provided where possible on all natural draught flue installations. If this dimension cannot be achieved please contact Andrews Water Heaters. Please note this is not required where a common flue header is used on multiple installations.

Fig 6.
Common flues may be used on multiple installations only if all the heaters are of the same burner system and fuel type and should be sized to ensure complete evacuation of the flue products from the installation.

Where one flue is to be used more regularly or for longer periods than the others in the group, it should be connected at the point nearest to the main flue. See BS 6644 Clause 20 for further information and recommendations on this as well as general flue requirements.

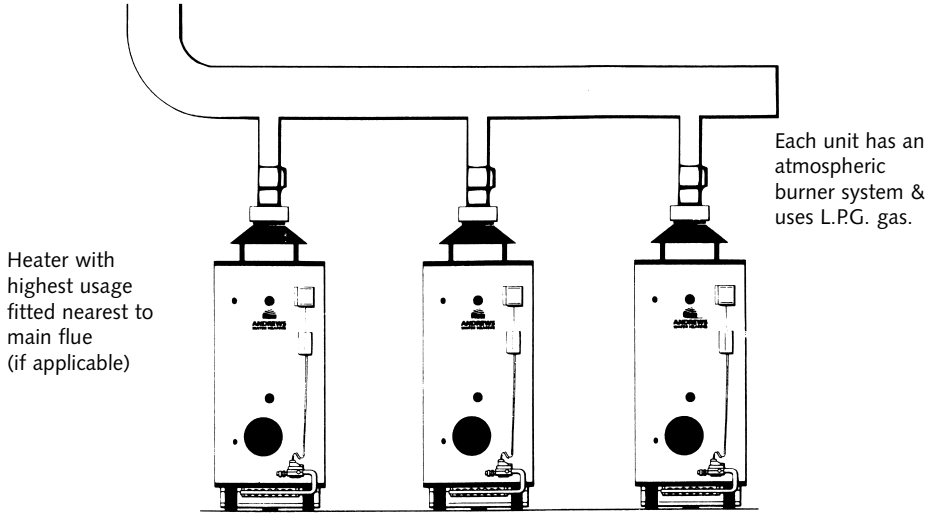

Heater with highest usage fitted nearest to main flue (if applicable)
Each unit has an atmospheric burner system & uses L.P.G. gas.

**Fig 6.**

Fit a flue clip or flange joint close to the diverter so that it is secure but can be disconnected for servicing. The weight of the flue must be borne by securing clips, etc. and not by the heater.

### Minimum Heights from Roof to Base of Flue Terminal

| Type of Roof | | Not within 1.5m (5ft) of a vertical surface of a structure ≠ on the roof | | | Within 1.5m (5ft) of a vertical surface of a structure ≠ on the roof | |
|---|---|---|---|---|---|---|
| | | Internal Route | | External Route | Internal Route | External Route |
| | | On Ridge | Not on Ridge | | | |
| Pitched | Pitch exceeding 45° | At or above ridge level | 1m (3.3 ft) above roof intersection | 1m (3.3 ft) above roof intersection | The base of the terminal should be 600 mm (24 in) above the level of the top of the structure | |
| | Pitch not exceeding 45° | | 600 mm (24 in) above roof intersection | The base of the terminal should be 600 mm (24 in) above the level of the adjacent roof edge | | |
| Flat | With parapet | Not applicable | 600 mm (2 ft) above roof intersection | | | |
| | Without parapet | | 250 mm (10 in) above roof intersection | | | |

## AIR SUPPLY AND VENTILATION

For all installations, please refer to the table below for calculating requirements. Detailed recommendations for the air supply are given in BS 5440 Part 2, BS 6644 Clause 19 and IGE/UP/10 Pt1.

**The following notes are provided for general guidance only.**

Ventilation shall prevent the heater environment from exceeding 32°C (90°F).
The purpose provided space in which the heater(s) are installed must have permanent air vents communicating directly with the outside air, at high and low level. Where communication with the outside air is possible only by means of high level air vents, ducting down to floor level for the lower vents must be used.
For an exposed building, air vents must be fitted on at least two sides, preferably on all four sides.

Air vents should have negligible resistance and must not be sited in any position where they are likely to- be easily blocked or flooded, or in any position adjacent to an extraction system which is carrying flammable vapour.

Grilles or louvres should be so designed that high velocity air streams do not occur within the space housing the heater(s).

The grilles should have a total minimum free area for the water heater(s) in addition to any other requirements as follows:-

**Where the heater is to be installed in a room the following permanent ventilation is required:**

5cm² per kW in excess of 7kW Net for installations up to 54kW Net.

**For installations exceeding 60kW the following permanent ventilation is required:**

**Low Level (inlet)** 540cm² plus 5cm² per kilowatt in excess of 54kW total Net input.
**High Level (outlet)** 270cm² plus 2.5cm² per kilowatt in excess of 54kW total Net input.

**Where the heater is to be installed in a compartment, permanent air vents are required in the compartment at high and low level. These air vents must either communicate with a room or internal space or be direct to outside air.**

**The minimum effective areas of the permanent air vents required in the compartment are as follows;-**

| | Air Vent Areas | |
|---|---|---|
| Position of Air Vents | Air from room or internal space | Air direct from outside |
| High Level | 10cm² per kW Net | 5cm² per kW Net |
| Low Level | 20cm² per kW Net | 10cm² per kW Net |

**Note:-** Both air vents must communicate with the same room or internal space or must both be on the same wall to outside air.

## AIR SUPPLY AND VENTILATION

**IMPORTANT!**

1. The effective area requirements specified in the table are related to the net heat input of the heater(s) and are equivalent to those specified in BS 6644 and IGE/UP10 Pt1.

2. The free area of the grilles should not be less than the size of the recommended ventilation opening.

3. The supply of air to a space housing the heater(s) by mechanical means should be:
   (a) Mechanical inlet with natural extraction.
   (b) Mechanical inlet with mechanical extraction.

**NOTE! Natural inlet with mechanical extraction must not be used.**

Where a mechanical inlet and mechanical extraction system is used, the design extraction rate must not exceed one third of the design inlet rate.

All mechanical ventilation systems must be fitted with automatic gas shut off safety systems which cut off the supply of gas to the heater(s) in the event of failure of either the inlet or extract fans.

The requirements for air supply by mechanical ventilation are given in BS 6644 Clause 19.3 and IGE/UP/10 Pt1.

The permanent air vents shall be sited away from any extract fans. Where an extract fan is fitted, check for spillage at the draught diverter as detailed in BS 5440 Part 1 Appendix B. It may be necessary to increase the ventilation area to compensate for the extract fan.

4. The vapours emitted by halogen based compounds can, if drawn into the combustion air, cause corrosion of the gas burner, thermocouple and storage vessel. Therefore, if heaters are to be installed in locations where halogens are likely to be present, they should be isolated from such compounds and ventilated from and to outside uncontaminated atmosphere.

Some of the vulnerable areas are:
(a) Hairdressing salons and adjoining rooms and basements
(b) Establishments where dry cleaning solutions are used or stored.
(c) Degreasing plants using hydrocarbon solvents.
(d) Premises where refrigerant gases are used or stored.

## WATER QUALITY AND TREATMENT

Where extreme conditions of water hardness exist, scale can form in any water heating equipment, especially when the heater is working under conditions of constant heavy demand and at high temperatures.

Each water heater is fitted with one or more magnesium anode(s) which protect the tank from corrosion caused by electrolytic action. Magnesium anodes are sacrificial in that they corrode as they protect. When the anode has eroded to less than 50% of it's original diameter, it may not offer protection.The anodes should be inspected annually and replaced as necessary. Frequency of anode replacement will vary dependent on water quality.

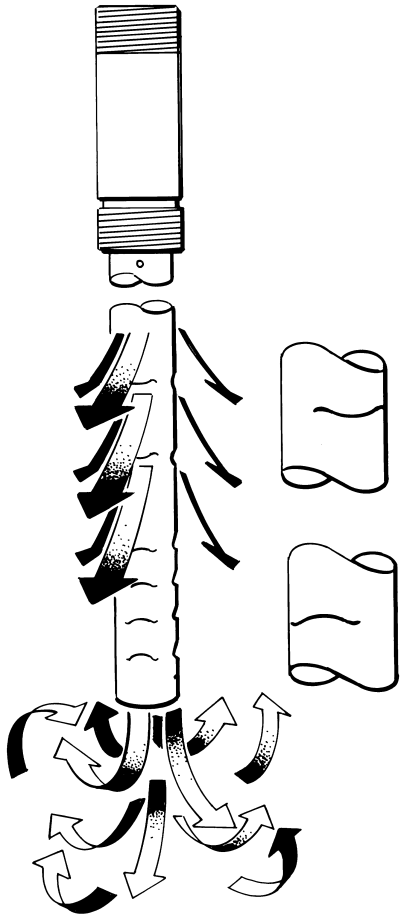
Andrews Water Heaters offer Correx™ UP powered anodes as an alternative to the standard magnesium anodes. These anodes do not need maintenance or replacement. The potentiostat which regulates the current to the Correx™ anode, features an indicator light which shows green to indicate correct function and red to indicate malfunction. These anodes are available as an optional extra on all Andrews heaters.

In hard water areas, scale formation can occur in hot water systems and hot water heaters and the higher the temperature and volume of water used, the more problematic the scale build-up can be. Water treatment is normally recommended when the hardness reaches 100 - 150ppm (7 - 10 degrees Clark) and above. This problem can be minimised by reducing the water temperature in the heater and by fitting suitable water pre-treatment equipment.

**When installing Andrews Water Heaters in hard water areas we would recommend that a water treatment specialist is consulted.**

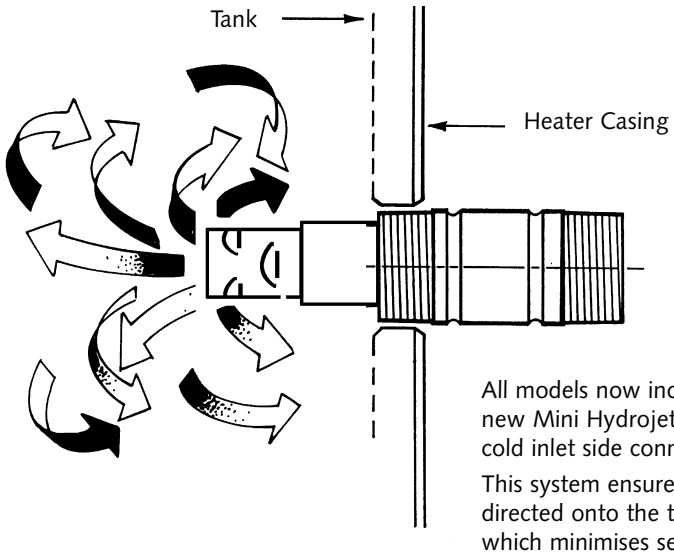
# WATER CONNECTIONS

**Hydrojet System**



The upper "jet ports" direct the flow outward to begin the dynamic mixing action.

The lower "jet ports" direct the flow inward to increase the turbulence.




All models now incorporate the new Mini Hydrojet system on cold inlet side connections.

This system ensures water is directed onto the tank base which minimises sediment build up from day one of installation.

**Mini Hydrojet Inlet Nipple (Side Cold Inlet Connection)**

The heater is fitted with the Hydrojet Total Performance System incorporated in the cold inlet dip tube. The tube is designed to increase turbulence and reduce sediment build up, reduce thermal stacking and increase delivery.

## WATER CONNECTIONS

### VENTED SYSTEMS, STANDARD RANGE

The water heater must be supplied from a cold water feed cistern and the hot water supply pipe must be fitted with an open vent pipe in accordance with BS 5546 and BS 6644.

The Water Supply (Water Fittings) Regulations 1999 must be observed when installing the system.

The cold water feed cistern must have an actual capacity greater than the hourly recovery rate of the heater or heaters to which it is fitted, the minimum actual capacity allowed for a feed cistern being 227 litres (50 gallons).

The actual cistern capacity is the capacity to the normal water line of the cistern.

All cisterns should be manufactured to the relevant British Standard.

The distance from the normal water line to the top of the cistern should comply with that specified by the Water Authorities.

The cold water inlet and hot water outlet connection nipples are identified on top of the heater.

Connect the cold water feed and hot water outlet to these nipples with union adaptors for ease of servicing.

**CAUTION!**

**DO NOT APPLY HEAT TO THESE NIPPLES IF MAKING CAPILLARY SOLDERED JOINTS AS THEY ARE FITTED WITH PLASTIC INSERTS. MAKE THE CAPILLARY JOINTS TO THE PIPES BEFORE CONNECTING TO THE HEATER. A DRAIN COCK IS SUPPLIED WITH THE HEATER AND THIS SHOULD BE FITTED TO THE APPROPRIATE BOSS AS SHOWN ON THE DRAWING.**

After installation of the water system, open the main water supply valve, flush the system and fill the heater.

Open the hot taps to allow air to escape from the system.

When the water is free of air, close the taps and check for leaks at the gas control thermostat, drain cock and the pipe connections at the top of the heater.

All water connections for Standard Range are shown in Fig 7.

**Typical water service layout for Standard Range single heater vented system is shown in Fig 8.**

**Typical water service layout for Standard Range multiple heater vented system is shown in Fig 8A.**

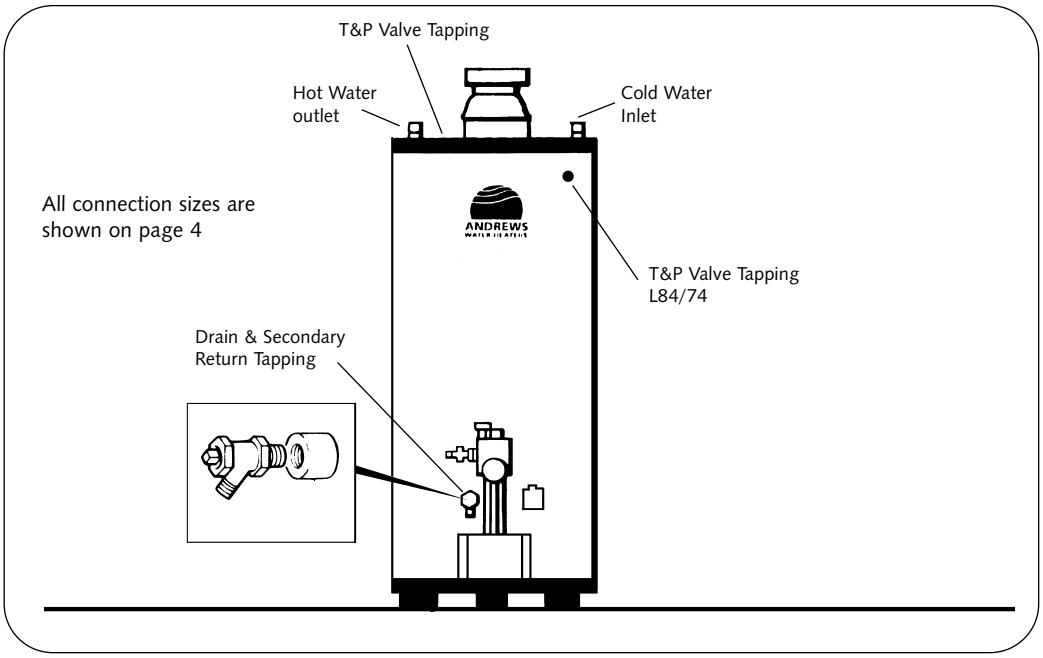



**Fig 7.**

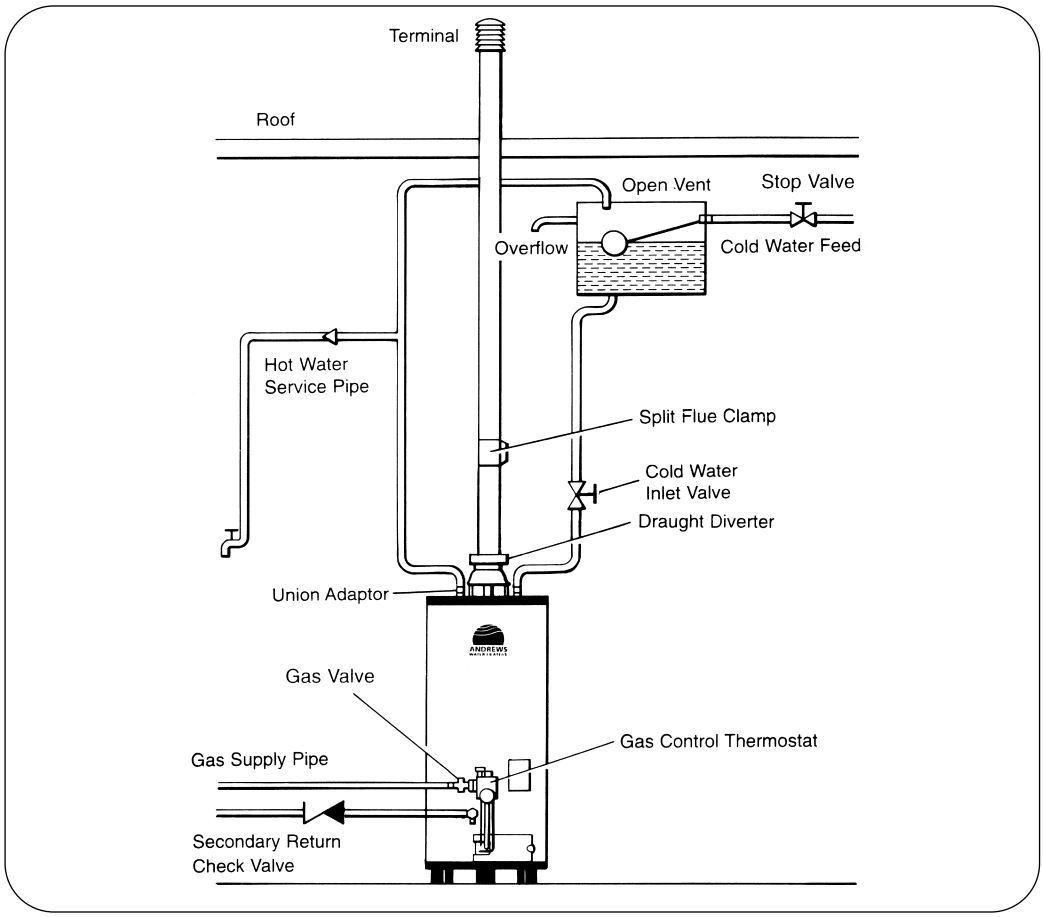

Terminal
Roof
Open Vent
Stop Valve
Overflow
Cold Water Feed
Hot Water
Service Pipe
Split Flue Clamp
Cold Water
Inlet Valve
Draught Diverter
Union Adaptor
Gas Valve
Gas Control Thermostat
Gas Supply Pipe
Secondary Return
Check Valve

**Fig 8.**

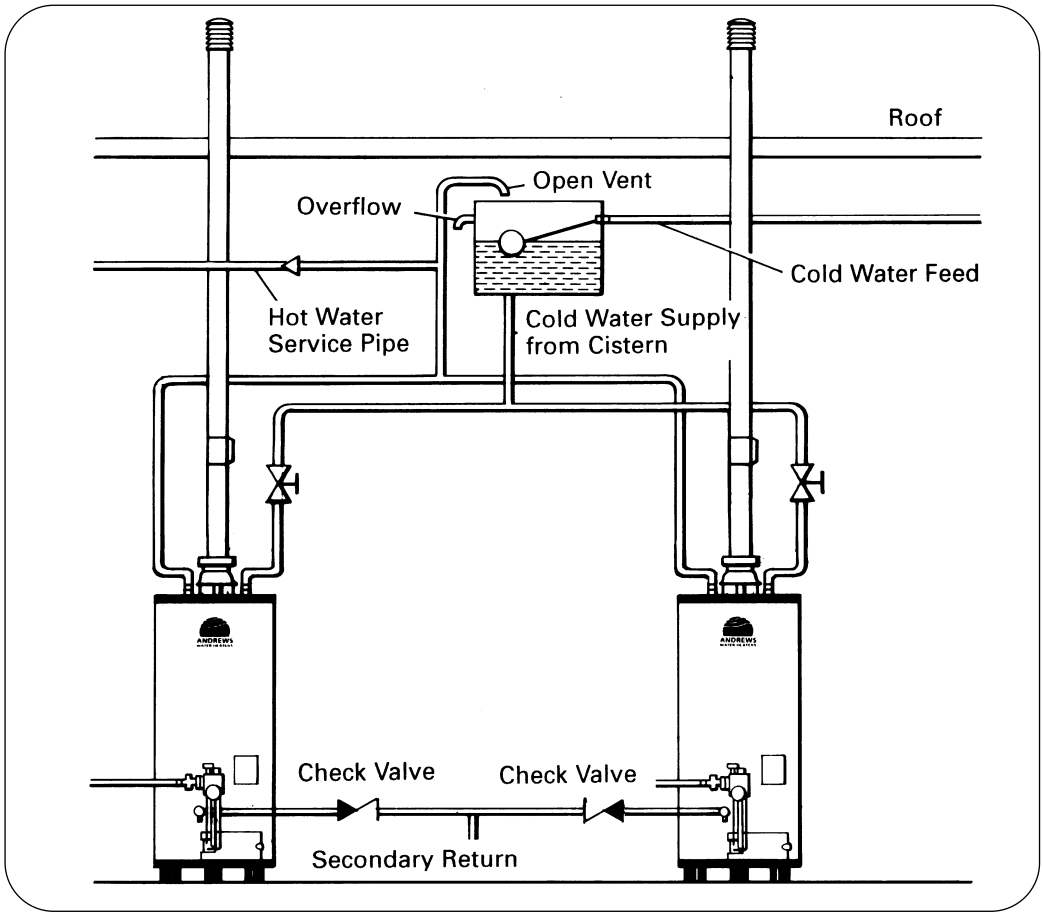

Roof
Open Vent
Overflow
Cold Water Feed
Hot Water
Service Pipe
Cold Water Supply
from Cistern
Check Valve
Check Valve
Secondary Return

**Fig 8a.**

## WATER CONNECTIONS

### UNVENTED SYSTEMS, STANDARD RANGE

Unvented Systems should be fitted by an Approved Installer
When used in an unvented system, the Andrews Water Heater will supply hot water at a pressure of 3.5bar (50.8lbf/in$^2$) provided that this pressure is available at the mains feed. During conditions of no-flow, system pressure may rise to a maximum of 6bar (87lbf/in$^2$) whilst the burner is operating. When testing the system, it is recommended that a maximum test pressure of 8.62bar (125lbf/in$^2$) is employed.

Fig. 9
The heater can be used on unvented hot water storage systems, with the addition of an Unvented Systems Kit, part number B171 available from Andrews Water Heaters. See Parts List Page 49. The Wall Mounting Kit is available as an optional extra.

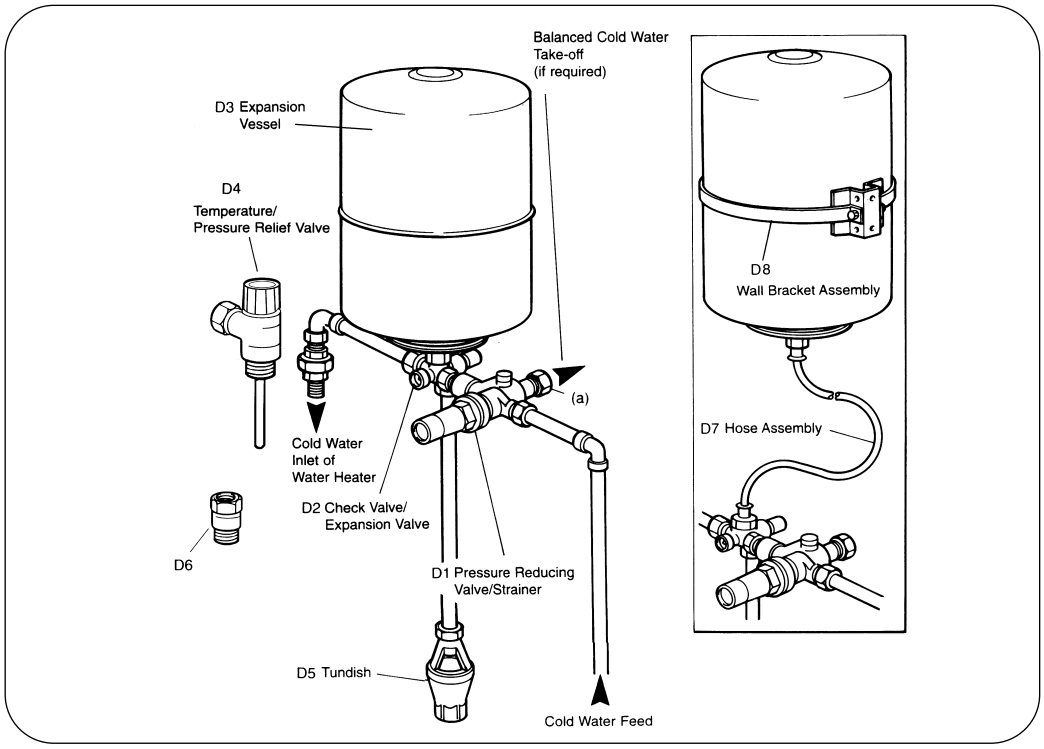



**Fig 9.**

Item D4 must be fitted into the temperature relief port in the water heater tank.
D6 Adaptor - For use with D4 on heater models L40/36, L63/71 & L84/74.
When assembling items D1 and D2, ensure that the flow arrows marked on the components are pointing in the direction of flow i.e. towards the water heater.

The cold water for services may be drawn from the 22mm compression port on item D1 (a). The water pressure at this point will be similar to that available at the hot water outlet of the water heater. If port (a) is not used, it should be sealed with the blanking plug supplied.

If higher flow rates are required for the cold water services, a suitable tee fitting should be fitted to the pipework, upstream of item D1.

The pipework fitted to the tundish outlet should be at least 28mm diameter and should be terminated at a suitable drain (see Building Regulations 1992 Approved Document G3).

All fittings and materials must be suitable for use with drinking water and listed in the current Water Research Centre "Materials and Fittings Directory".

Installation of unvented hot storage water systems must comply with Part G3 of the Building Regulations 1992.

**Typical water service layout for Standard Range single heater unvented system is shown in Fig 10.**

**Typical water service layout for Standard Range multiple heater unvented system is shown in Fig 11.**

## WATER CONNECTIONS

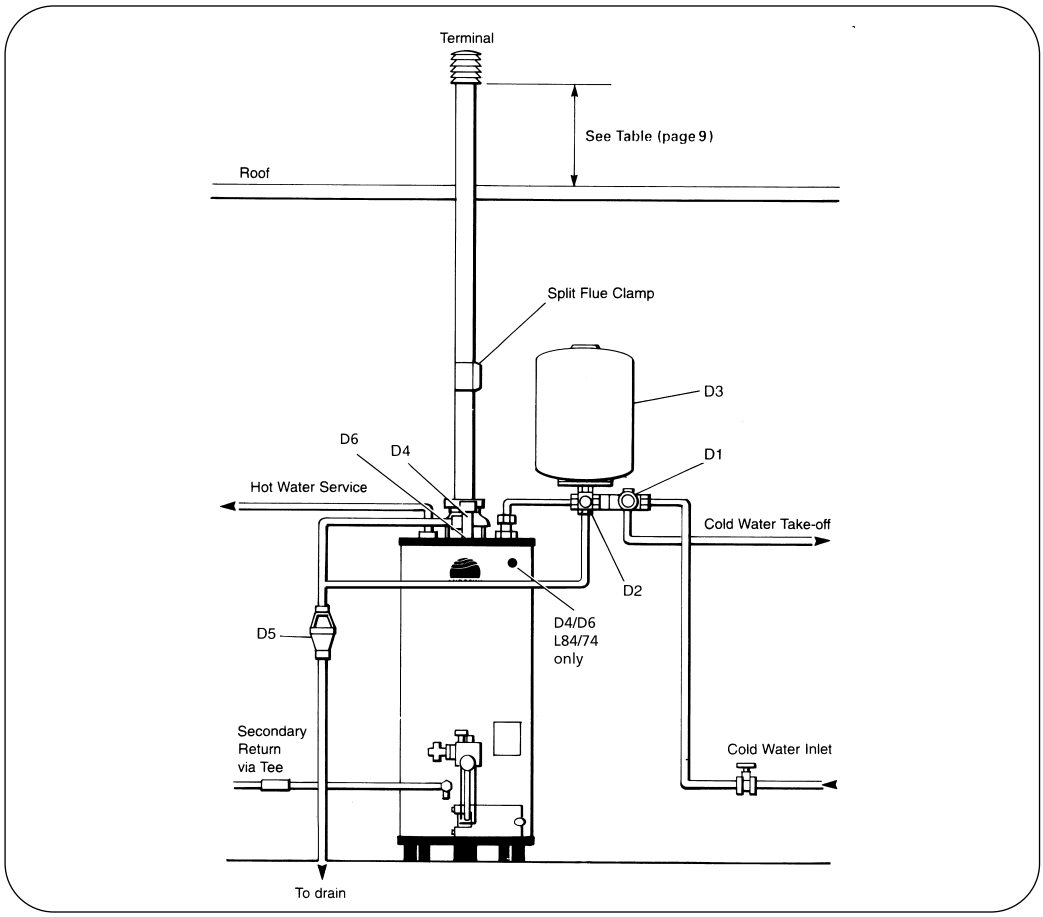



**Fig 10.**

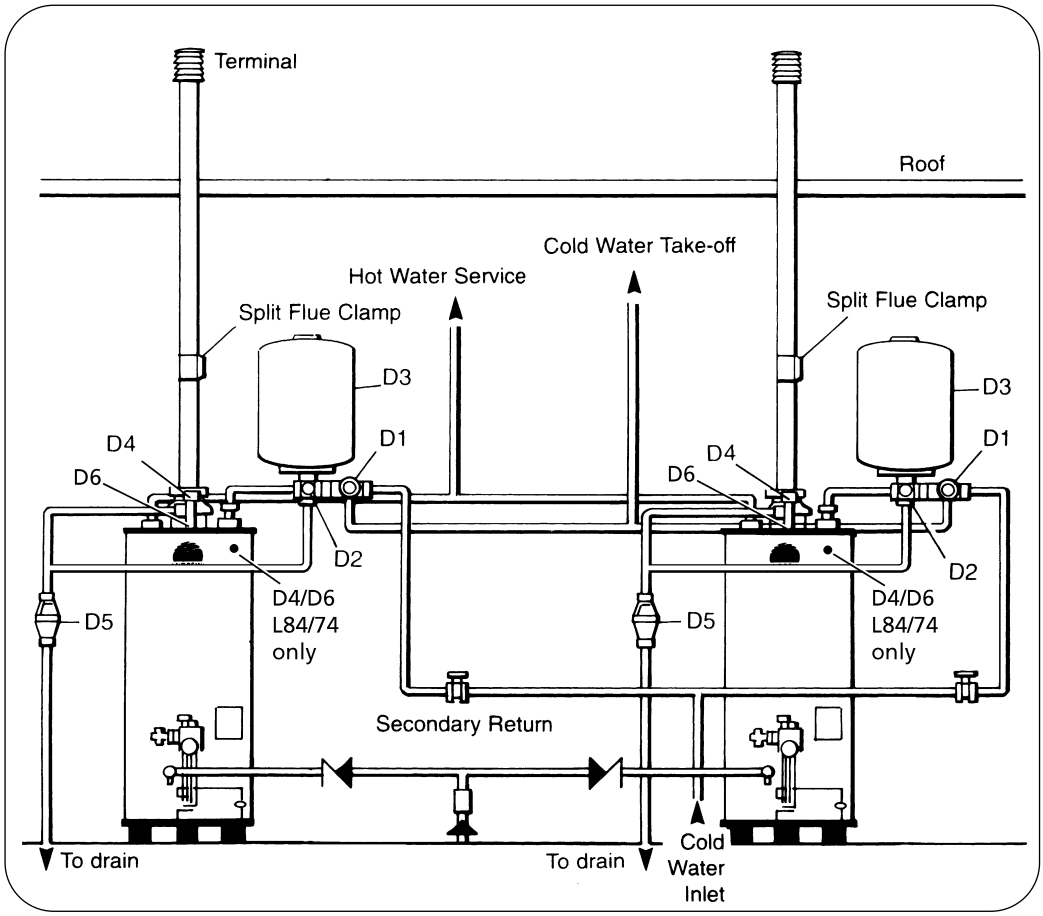



**Fig 11.**

## WATER CONNECTIONS

### VENTED SYSTEMS, Hi-Flo RANGE

The water heater must be fed from a cold water feed cistern or static water tank.

A safety valve must be fitted as specified in BS 6644 Clause 9.
(see also Section 2, Technical Data)

The safety valve must be fitted either directly to an upper tank tapping or not further than 1 metre along the outlet flow pipe of size not less than the safety valve.

There must be no valve separating the heater from the safety valve.

The size of the discharge pipe must be not less than the nominal size of the safety valve outlet. It should be self-draining and any water discharged must be visible and create no hazard to persons in or about the building.

A low pressure open vented system can be used or where the natural circulating pressure is insufficient, pumped circulation can be employed.

The heater must be fitted with an open vent pipe which is not valved and which rises continuously to the open vent. It should be sized with reference to Technical Data, BS 6644 Clauses 9 and 10 and CP 342. Local Regulations and Bye-Laws must be observed when installing the system.

Water draw-off dead legs should comply with CP 342 Part 2, Table 1 and BS 6700.

Fig 12.
**Models L65/169, L81/251. Optional top inlet/outlet water connections**
Select the cold/hot location required (i.e. top inlet/outlet or front inlet/outlet) and, using a suitable jointing compound, blank off the two ports not required.

**All Models. Front inlet/outlet water connections**
**Models 32/143. Optional rear inlet/outlet water connections**
Assemble onto the 3/4 BSP thread, the 3/4 BSP couplet socket (1) and drain cock using a suitable jointing compound. Select the Cold/Hot location required and using a suitable jointing compound, blank off the two ports not required.

**Models 32/143, 62/341, 54/418, 54/440**
A 3/4 BSP thread connection is available at the top of the heater, this is suitable for a Automatic Air Vent if required (Not supplied).

NOTE
When using a secondary return circuit, see Fig 11 for the locations of the return tappings.

It is recommended that all water connections be made to the heater(s) using union fittings for ease of servicing. Pipe support intervals should comply with CP 342, Part 2 Table 4.

After Installation of the water system, open the main water supply valve, flush the system and fill the heater. Open the hot taps to allow air to escape from the system. When the system is free of air, close the taps and check for leaks at the gas control thermostats, drain cock and pipe connections on the heater.

**Typical water service layout for Hi-Flo Range single heater vented system is shown in Fig 13.**

**Typical water service layouts for Hi-Flo Range multiple heater vented systems are shown in Figs 14 and 15.**

# WATER CONNECTIONS

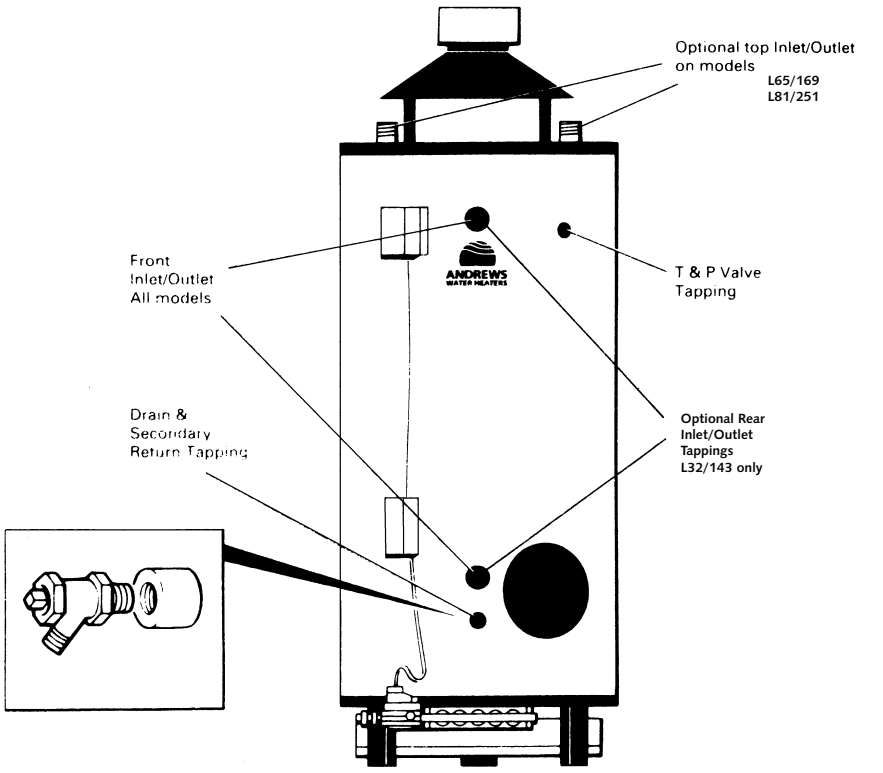



**Fig 12.**

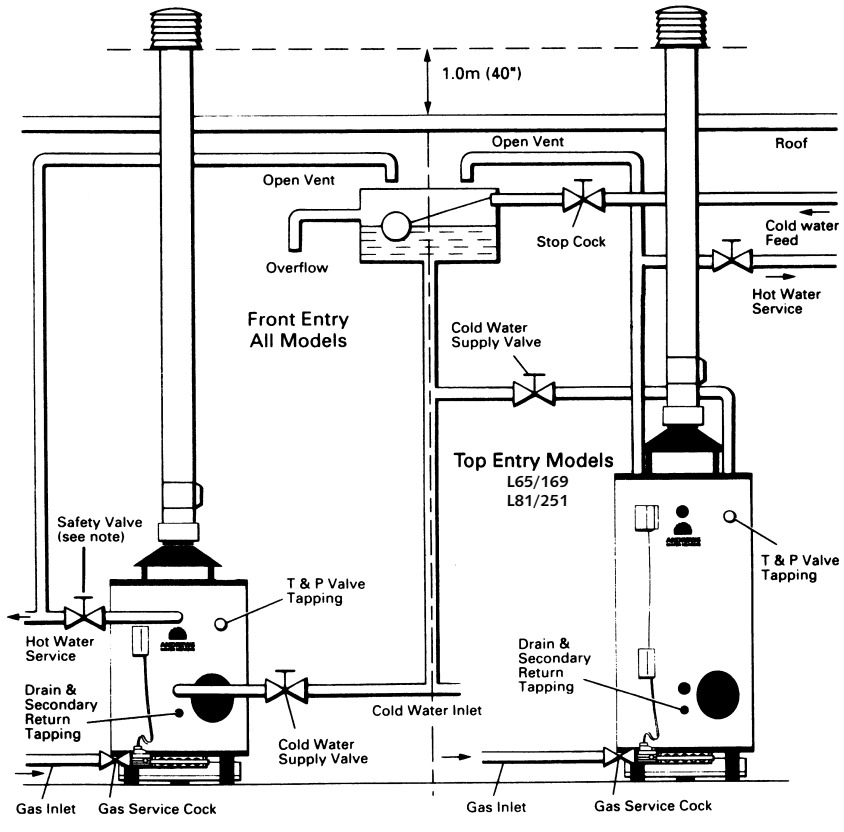



**Fig 13.**

## WATER CONNECTIONS

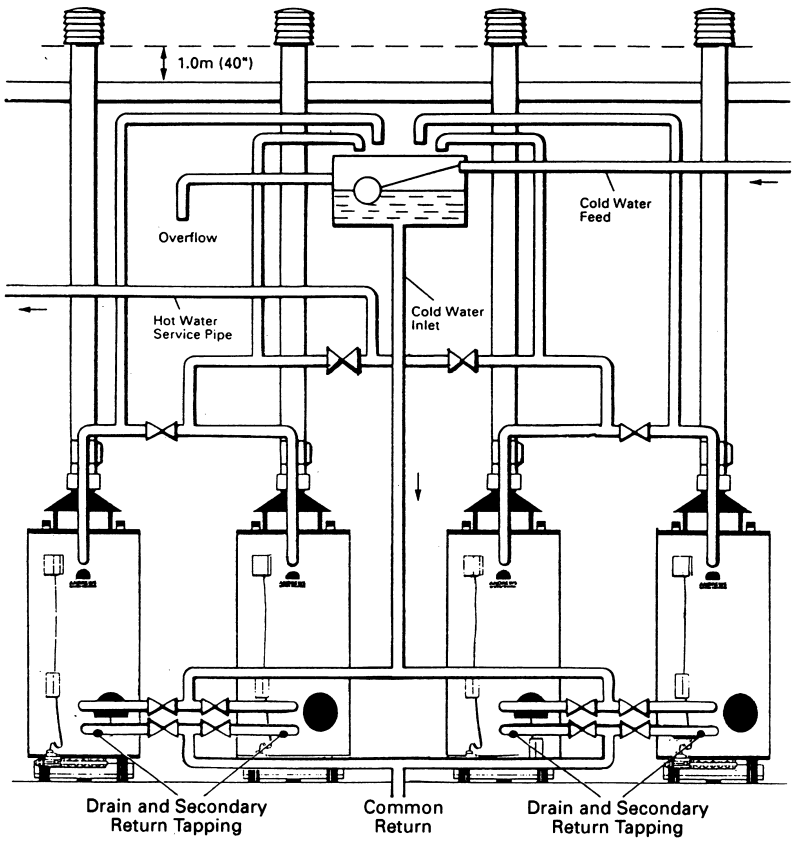



**Fig 14.**

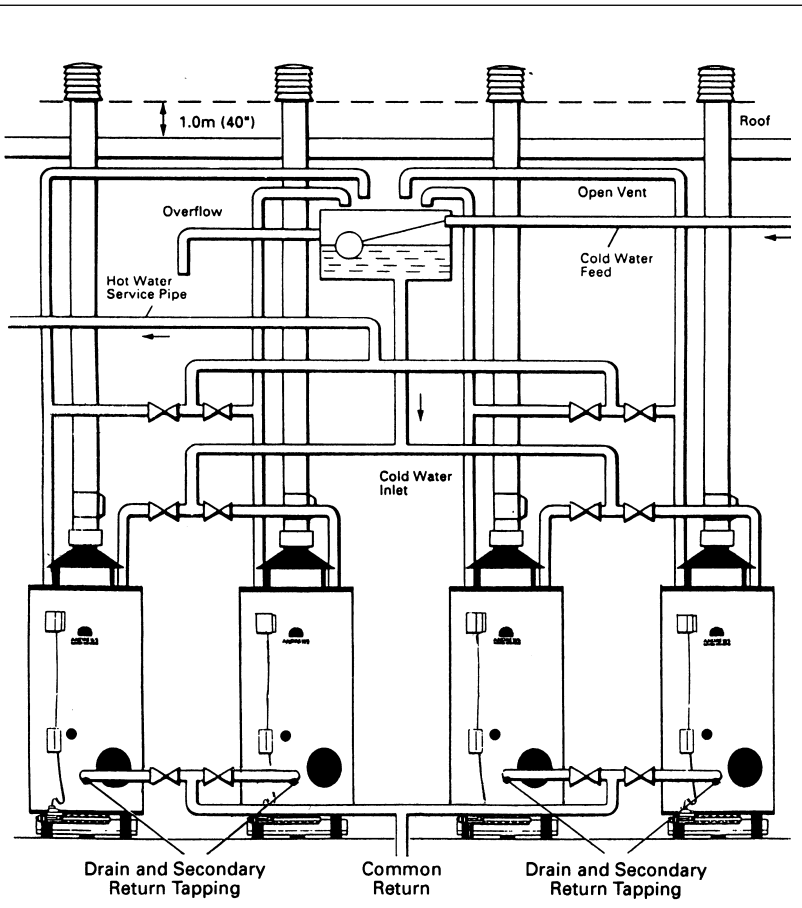



**Fig 15.**

## UNVENTED SYSTEMS, Hi-Flo RANGE

## WATER CONNECTIONS

**Unvented Systems should be fitted by an Approved Installer**
When used in an unvented system, the Andrews Water Heater will supply hot water at a pressure of 3.5bar (50.8lbf/in$^2$) provided that this pressure is available at the mains feed. During conditions of no-flow, system pressure may rise to a maximum of 6bar (87lbf/in$^2$) whilst the burner is operating. When testing the system, it is recommended that a maximum test pressure of 8.62bar (125lbf/in$^2$) is employed.

Fig 16.
The heater can be used on unvented hot water storage systems, with the addition of an Unvented Systems Kit, part number B172 available from Andrews Water Heaters.
See Parts List Page 49. The Wall Mounting Assembly is available as an optional extra.

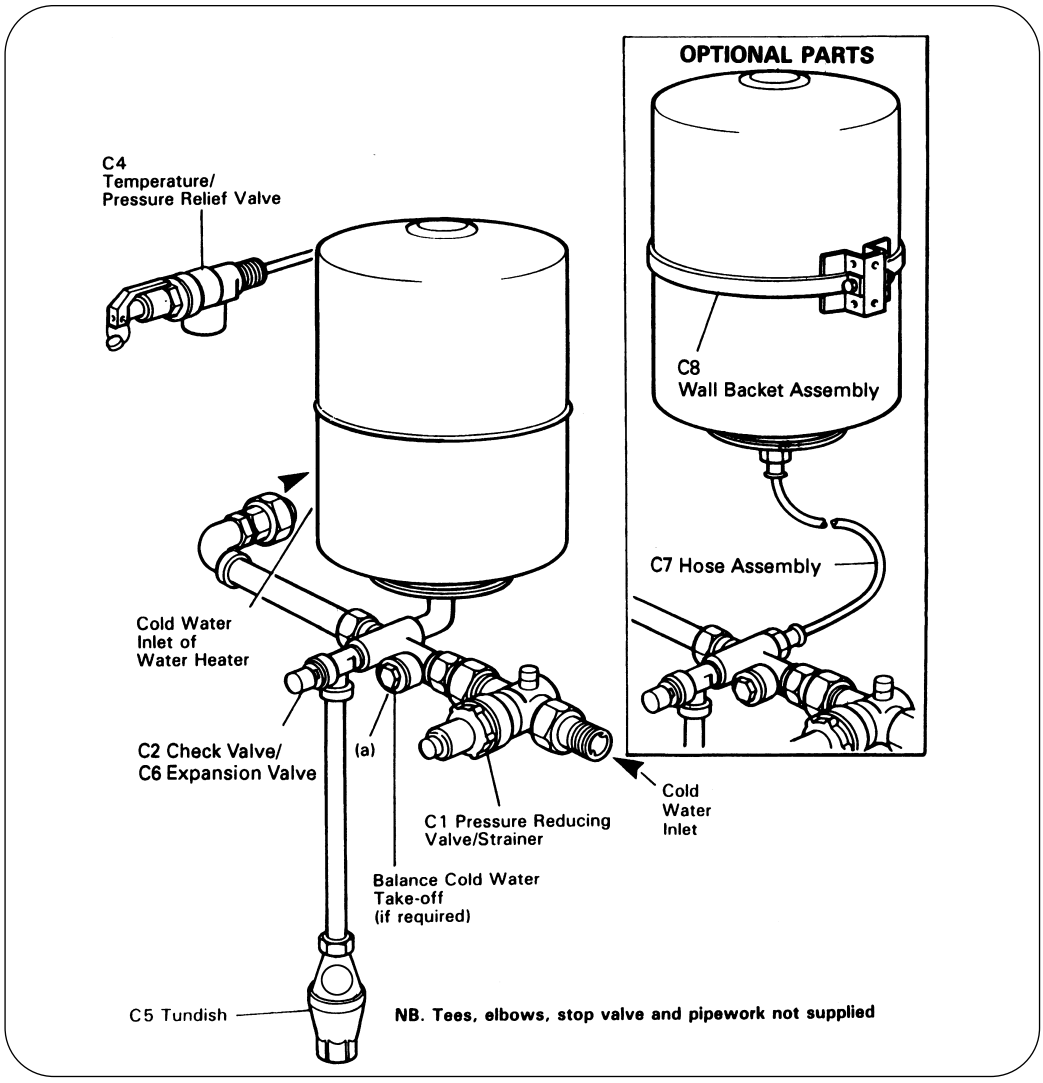



**Fig 16.**

Item C4 must be fitted into the temperature relief port in the water heater tank.

When assembling items C1 and C2, ensure that the flow arrows marked on the components are pointing in the direction of flow i.e. towards the water heater.

The cold water for services may be drawn from the 22mm compression port on item C1 (a). The water pressure at this point will be similar to that available at the hot water outlet of the water heater. If port (a) is not used, it should be sealed with the blanking plug supplied.

## WATER CONNECTIONS

If higher flow rates are required for the cold water services, a suitable tee fitting should be fitted to the pipework, upstream of item C1.

The pipework fitted to the tundish outlet should be at least 28mm diameter and should be terminated at a suitable drain (see Building Regulations 1992 Approved Document G3).

All fittings and materials must be suitable for use with drinking water and listed in the current Water Research Centre "Materials and Fittings Directory".

Installation of unvented hot storage water systems must comply with Part G of the Building Regulations 1992.

**Typical water service layout for Hi-Flo Range single heater unvented system is shown in Fig 17.**

**Typical water service layouts for Hi-Flo Range multiple heater unvented systems are shown in Figs 18 and 19.**

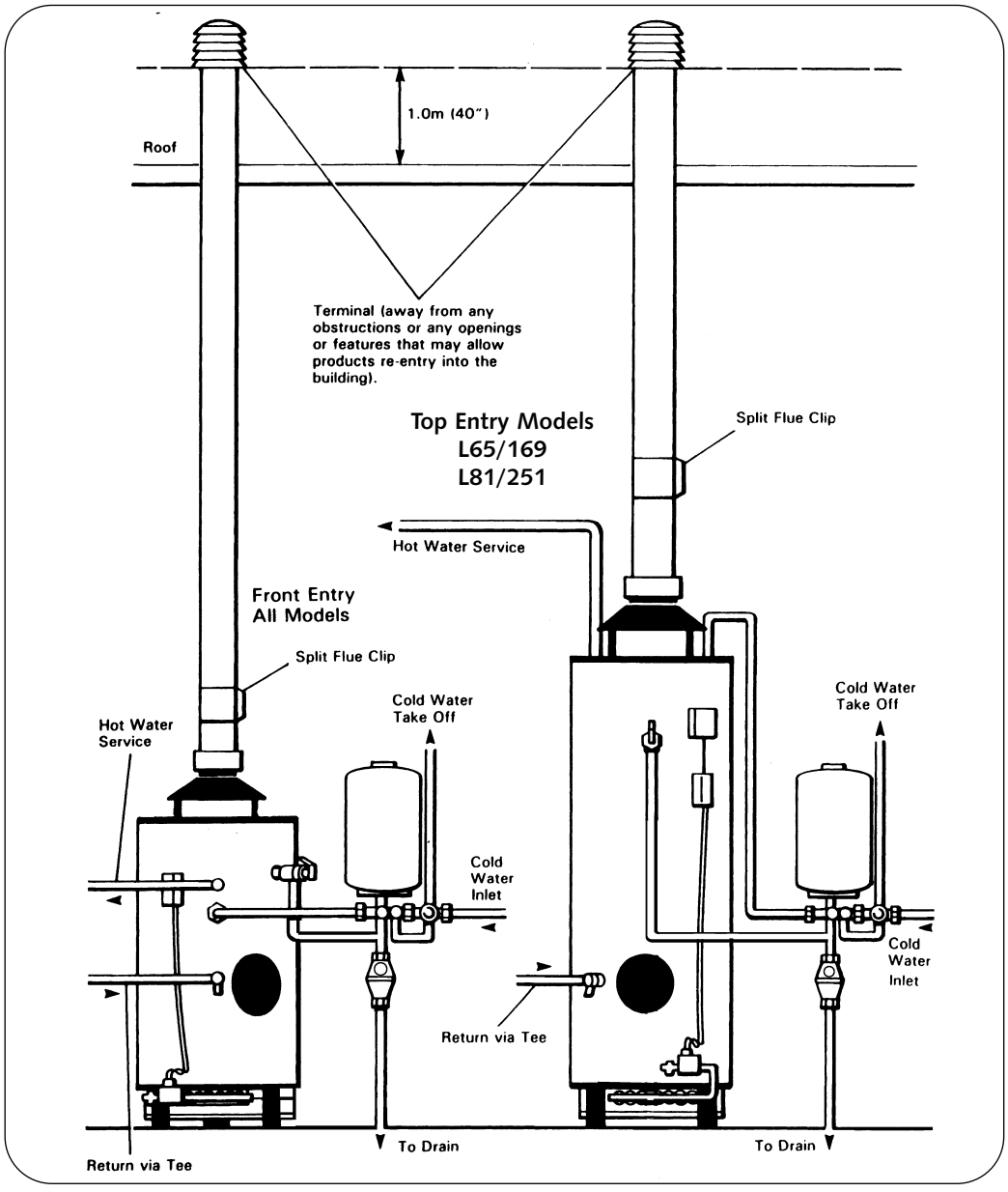



**Fig 17.**

## WATER CONNECTIONS

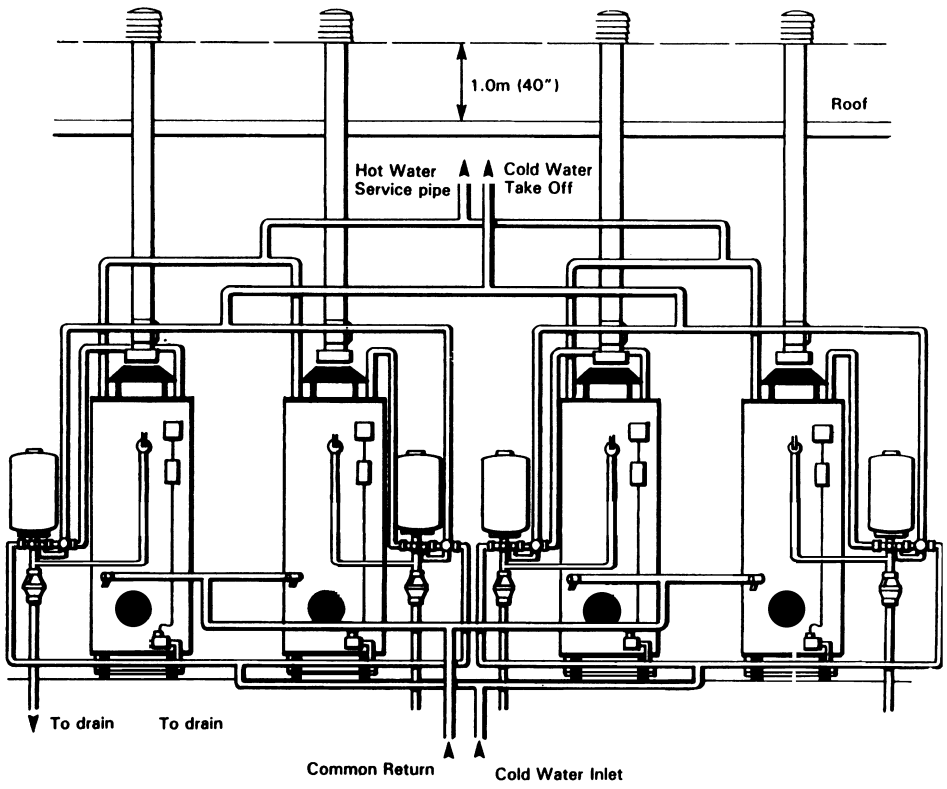



**Fig 18.**

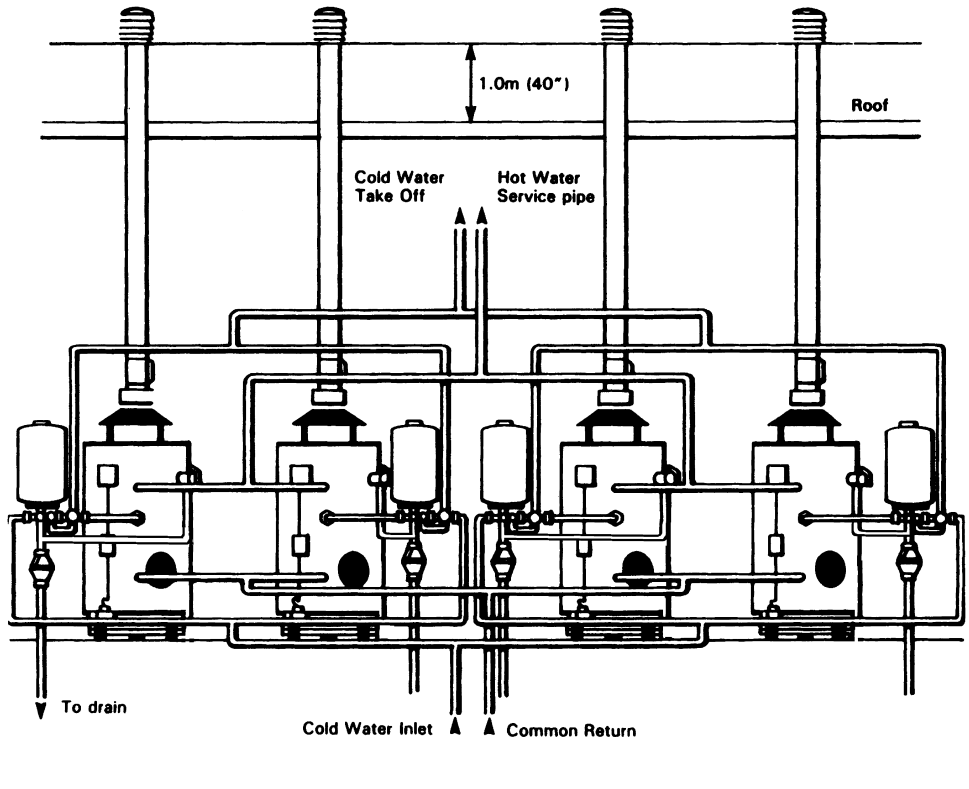



**Fig 19.**

## STANDARD RANGE
PERMANENT PILOT MODELS

**CAUTION! DO NOT OPERATE THE WATER HEATER UNTIL THE STORAGE VESSEL IS COMPLETELY FILLED WITH WATER, WITH WATER RUNNING FROM ALL HOT TAPS.**

Open the main gas supply cock after all connections to the gas control are completed and test all connections, using proprietary leak detection fluid.

**Lighting the Burner**

1. Remove outer cover and slide inner cover to right. (On L63/71 and L84/74 Models, raise the inspection port cover). Wait for 3 minutes for any unburnt gas to vent.
2. Turn the gas control knob to pilot.
3. Fully depress the RED button and light the pilot burner. With the pilot burner alight, hold the red button in for 20 seconds. When the red button is released, the pilot should remain lit. If not, wait for 3 minutes then repeat this operation.
4. Close and refit covers.
5. Set temperature indication dial to required temperature as follows:

| Setting | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Approx. Water Temperature | 105ºF (41ºC) | 120ºF (49ºC) | 135ºF (57ºC) | 150ºF (66ºC) |

6. Turn the gas control knob to ON and the burner should light. If not, WAIT FOR AT LEAST 3 MINUTES AND REPEAT FROM STEP 1.

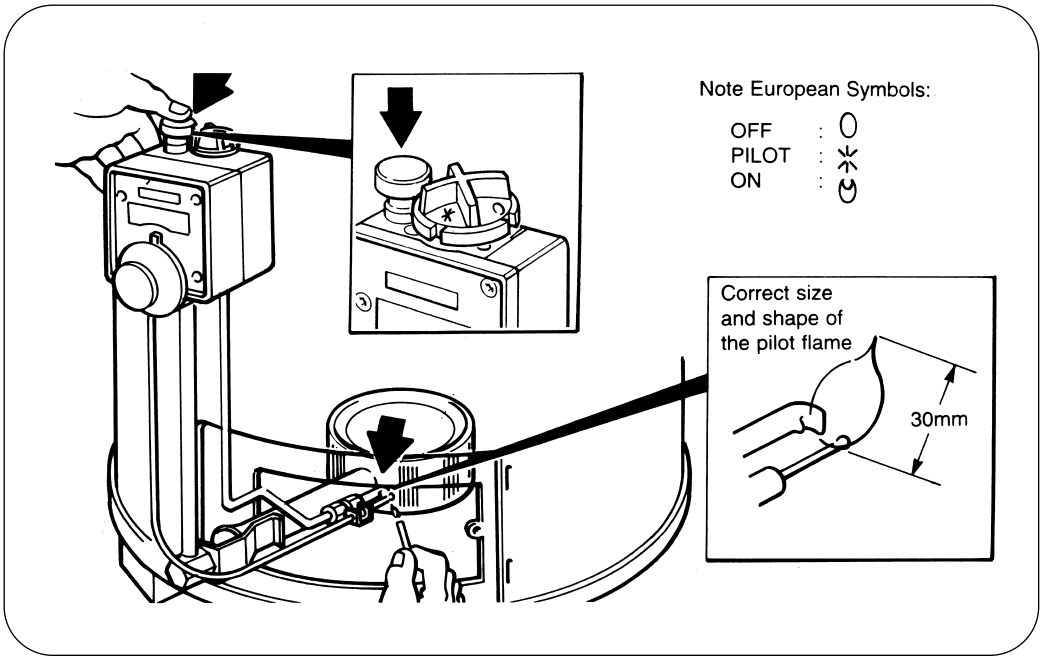



**Fig 20.**

**Shutting Off The Burner**

For long periods only (7 days or more) turn gas control knob to PILOT, depress slightly and turn clockwise to OFF. Turn off the gas service cock. For shorter periods, leave the heater under thermostat control.

**NOTE! If the pilot goes out for any reason, turn off heater and wait for 3 minutes before relighting.**

**Checking Main Burner Pressure**

1. Turn burner OFF as above.
2. Release bleed screw A one turn and connect pressure gauge tube.
3. Light burner as described above.
4. By means of the external in-line regulator, set burner pressure for gas being used in accordance with the data plate.
5. Remove pressure gauge tube and tighten bleed screw.
6. Leak test using leak detection fluid.

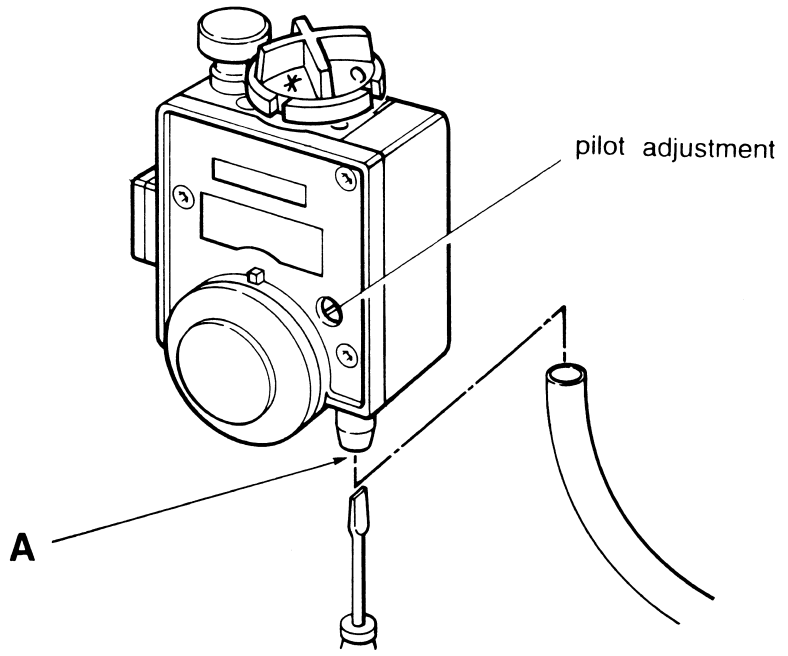



**Fig 21.**

## HI-FLO RANGE

### Lighting the Burner

Open the main gas supply cock after all connections to the gas control are completed and using a manometer, test all connections up to the gas control inlet. Purge air from pipework and ensure there are no loose connections to burner or pilot pipe.

1. Ensure gas supply is on.
2. Turn gas control knob to PILOT position.
3. Depress knob and activate piezo igniter.
4. Keep knob pressed in for a further 40 seconds after pilot lights, then release knob and check that pilot remains lit. If not, turn off then wait 3 minutes before repeating from step 2. Observe via the view port.
5. Turn control knob to ON and turn control thermostat dial to required water temperature. The burner will now light.
6. Check pilot and gas connections for soundness with leak detection fluid whilst burner is alight. Turn off, seal any leakages, then re-test.

**WARNING! if pilot goes out, do not attempt to relight gas until at least 3 minutes have elapsed.**

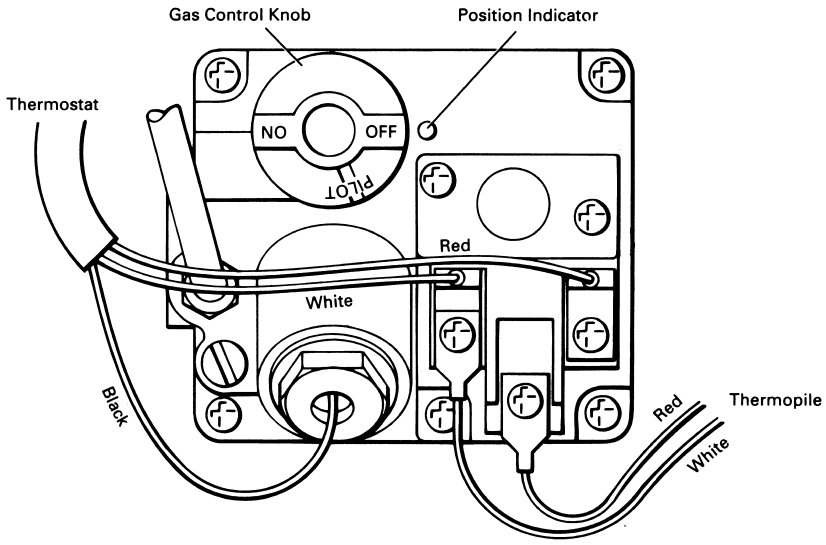



**Fig 22.**

### Shutting Off The Burner

For long periods only, (7 days or more) turn control knob to PILOT, partially depress knob, then turn clockwise to OFF. Turn off gas service cock. For shorter periods leave heater under thermostat control.

### Checking Incoming Gas Pressure

1. Turn gas control knob clockwise to OFF.
2. Release bleed screw A and connect pressure gauge tube.
3. Light burner as described above.
4. With the main burner running, the incoming gas pressure must be as follows:
   PROPANE 37 mbar (14.86 in W.g.)
   BUTANE 28 mbar (11.26 in W.g.)
   The service governor should be adjusted if necessary to give the above values.
5. Turn the gas control to OFF, remove the pressure gauge, tighten the bleed screw and check for gas leaks using a leak detection fluid.

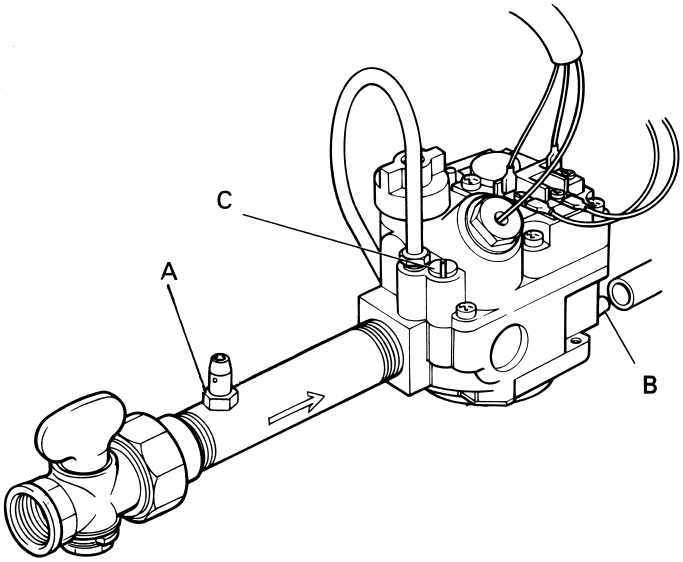



**Fig 23.**

**Checking Main Burner Pressure**

1. Turn gas control knob clockwise to OFF.
2. Release bleed screw A and connect pressure gauge tube.
3. Light burner as described above.
4. With the main burner running, check that the burner pressure is as stated on the data plate and in Section 2, Technical Data.
5. Turn the main gas control knob to OFF, remove the pressure gauge, tighten the bleed screw and test for gas leaks (when the burner is re-lit) with a leak detection fluid.

**Checking Correct Shape and Size of Pilot Flame**

No adjustment is provided for the pilot. The restrictor (C) of the multifunctional control should be fully open (turned fully anti-clockwise).

When viewed from the front of the heater, the pilot flame should appear as shown in Fig. 24.

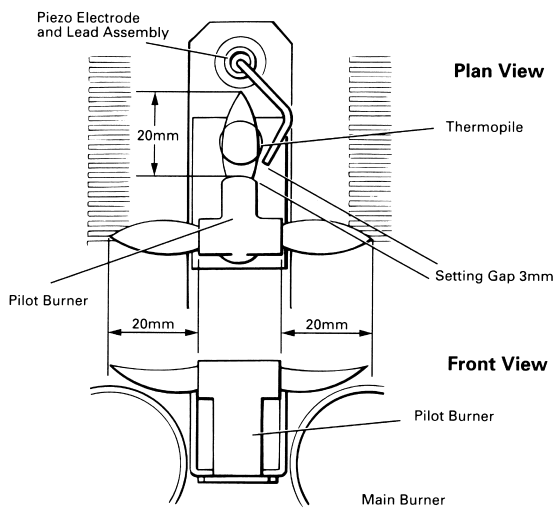



**Fig 24.**

**STANDARD RANGE**
AUTO IGNITION MODELS

**Lighting the burner**

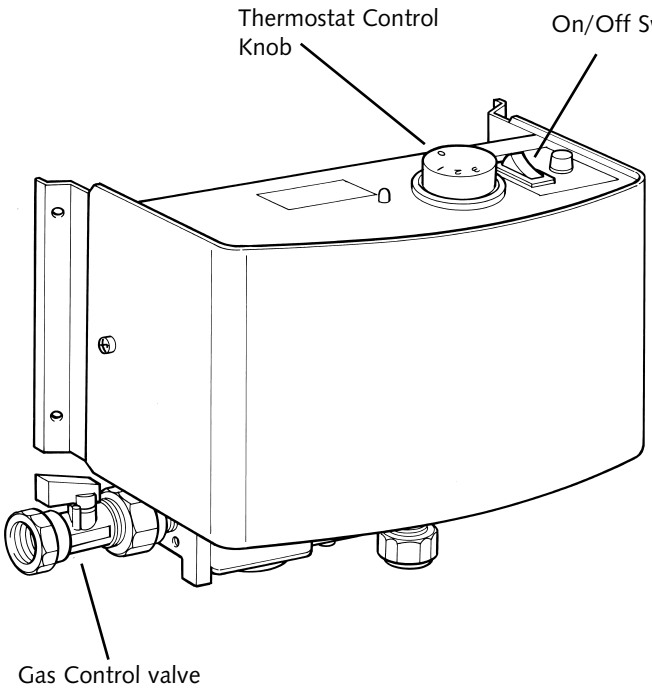



**Fig 25.**

1. Ensure gas supply is on.
2. Set thermostat control knob to the required water temperature. (See below).
3. Ensure time switch if fitted is in the ON position.
4. Move electrical ON/OFF switch to ON and the burner will light.
5. Check pilot and main gas connections at gas control valve using leak detection fluid whilst burner is alight. Turn OFF, seal any leakages then re-test.

**Shutting OFF burner**

To shut OFF the burner move switch to OFF then turn OFF the gas service cock.

The water heater should only be turned OFF for long periods, eg holidays, or in an emergency. Otherwise the heater should be left to operate under normal thermostat control.

NB. When using a time control ensure the heater is not turned OFF before the final water draw off occurs. This will ensure the water in the tank is left in a hot condition.

| THERMOSTAT SETTING | 1 | | 2 | | 3 | |
|---|---|---|---|---|---|---|
| APPROX WATER TEMP. | 104°F | 40°C | 131°F | 55°C | 158°F | 70°C |

**Checking main burner pressure**

1. Turn gas supply OFF.
2. Release bleed screw A one turn and connect pressure gauge tube.
3. Light burner as described above.
4. By means of the external in-line regulator, set burner pressure for gas being used in accordance with the data plate.
5. Remove pressure gauge tube and tighten bleed screw.
6. Leak test using leak detection fluid.

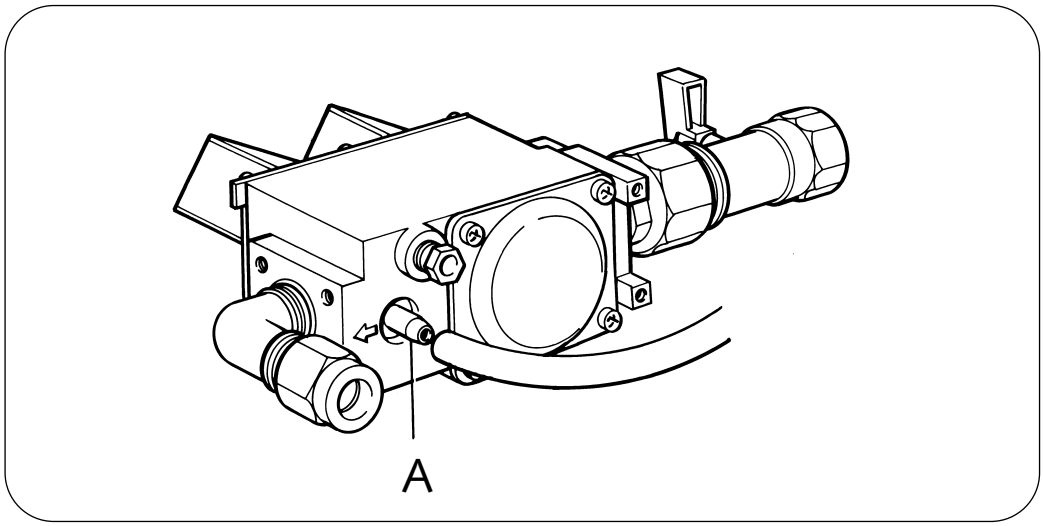



**Fig 24.**

**STANDARD RANGE**

**HI-FLO RANGE**

**ALL MODELS**

**Checking for Spillage at the Draught Diverter**
If an extract fan is fitted, (see Air Supply and Ventilation) carry out a spillage check as set out in BS 5440 Part 1, Appendix B. If spillage does occur, increase the ventilation area until the products clear well. If an openable window is in the boiler house or room containing the heater(s), turn on the extract fan and heater(s). Open the window fully, and, using a stiff card, gradually reduce the opening until the appliance(s) just spills. Then increase the opening until the products clear well. Measure the opening for the additional area required.

**INSTRUCTING THE USER**

**ALL STANDARD AND HI FLO MODELS**
When satisfactory commissioning and testing has been achieved, hand this manual to the User or Purchaser and explain the method of economic and efficient operation.

Explain that:
1. Other than for long shutdown periods, the heater must be left operating normally.
2. It is important that the control thermostat is set at the lowest temperature consistent with the user's needs.

Ensure that the user or purchaser is fully conversant with the lighting, shutdown and general operating procedures, including the emergency procedure. (See p.32).

Advise that any air vents must be kept clear and items must not be placed or stored in the vicinity of the heater.

Advise of precautions necessary to prevent damage to the heater and systems in the event of the system remaining inoperative during frost conditions.

Advise the user or purchaser that for continued efficient and safe operation of the heater, it is important that magnesium anodes are inspected annually and that adequate servicing is carried out at regular intervals by the installer or by the local gas authority.

## USERS SAFETY GUIDE

For your safety read before lighting the appliance

**WARNING**

1. Always follow manufacturers instructions when lighting the appliance. Failure to do
   so may result in damage to property, personal injury or loss of life.

2. Before lighting check all round the appliance area for gas. Be sure to check at low level because some gas (i.e. LPG) is heavier than air and will settle on the floor.

3. Do not make any attempt to re-light the appliance if the main burner has extinguished. Wait at least 5 minutes to allow for any unburnt gas to disperse. Ventilate the area if possible.

**FOR YOUR SAFETY IF YOU SMELL GAS**

1. Turn off gas supply and open windows.
2. Do not operate electrical switches.
3. Extinguish any naked flames.
4. Contact gas supplier if the smell of gas persists.

**FOR YOUR SAFETY**

Do not store or use petrol, aerosol or other flammable vapours or liquids in the vicinity
of this or any other atmospheric gas appliance.

**WARNING**

Hotter water increases the risk of scalding. Before changing the temperature refer to instruction manual or data label. Hot water can produce third-degree burns in:
6 seconds at 140ºF (60°C)
30 seconds at 130°F (54°C)

When properly installed and adjusted, the heater will require minimal attention. Should it become necessary to completely drain the heater, close the cold water inlet valve and open a hot water tap to allow air to enter the system. Fit a suitable hose to the drain cock and open.

Whenever the heater is filled with cold water, condensation will form on the storage vessel surfaces when the burner is lit. This is normal and will disappear when the heater warms up.

The gas control fitted to the heater has a built-in limit thermostat (ECO). In the event of high water temperature, the gas supply will be shut off automatically. The high temperature condition must be identified and rectified before the heater can be relit. A replacement gas control valve must be an identical model with the same code number Robertshaw R110RTS.

**STANDARD RANGE**
FOR AUTO IGNITION SEE BELOW

**Auto-Ignition Unit, Operating Sequence. Standard Range**
1. When the control thermostat senses too-cool water, a signal is sent to the control sequence unit.
2. Gas is allowed to pass to the pilot and simultaneous ignition begins.
3. When the pilot flame is established, the main gas solenoid is allowed to slowly open and the main burners or burner is lit.
4. When the control thermostat is satisfied, both pilot and main gas solenoids are closed.

**HI-FLO RANGE**

**Operating Sequence**
1. With the pilot lit, the solenoid coil holds the inlet gas port on the gas valve open.
2. The knob on the gas valve is set to the ON position.
3. The control thermostat is set to the desired water temperature, 49°C to 82°C (1200°F to 180°F). To set the thermostat, remove the outer cover and turn the adjustment dial to the required temperature.
4. The thermostat should now be in a closed position allowing the current generated by the pilot-energised thermopile to open the main burner valve.
5. The gas valve has a slow burning feature. Burners will light several seconds after setting the thermostat.
6. Burners will continue to heat water until the preset temperature is reached. As the thermostat opens, the thermopile current is interrupted and the main gas valve will close.

**ECO (Energy Cut-Off)**
The heater is equipped with an ECO (Energy Cut-Off) device, fitted to the control thermostat. This is a temperature sensitive switch which opens at high temperature, shutting off gas to the burners, including the pilot in an overheat condition. If the pilot goes out and is associated with high water temperature, the ECO is probably operational and the cause of overheating should be investigated.

**Temperature Stratification (Stacking)**
When small amounts of hot water are drawn repeatedly, the thermostat responds to each feed of cold water and activates the main burners. Each time this occurs, more heat may be put back in the tank than was drawn off. As this continues, water in the upper level of the tank gets hotter than the thermostat setting. This hotter water does not mix completely with the cold inlet water but rises in a 'chimney effect' to the top of the tank. Many repetitions of this over a short time period result in accumulation of excessively hot water in the upper part of the tank, even when the thermostat control is within limits. This is known as stacking.

To counter this condition, an upper thermostat phial is fitted (not on Model L32/143) which senses abnormally hot water and shuts down the main burner until the water cools.

Most modern commercial pipe installations include a circulating pump which keeps hot water moving continuously throughout the heater. This stabilises temperatures in the water heater tank and throughout the pipe system.

## INTRODUCTION

**Servicing must be carried out by a properly qualified person**

Whilst giving these instructions for the care of the Heater, it is recommended that checks are carried out by the installer or local gas authority, at least annually. Ensure good ventilation by keeping the heater free of extraneous materials and clear of dust and lint. Keep pipework, flue and tops of heaters clear of any combustible materials. A water softener or lime inhibitor should be employed in hard water areas. The heater should be inspected every few months via the hand hole cleanout and lime or silt deposits removed. Failure to do so will shorten heater life and may invalidate the warranty.

NOTE! The cleanout hole gasket must be renewed whenever the cover is removed.

## PRE-SERVICE OPERATIONS

**Before servicing, carry out the following operations.**

1) Turn off the gas service cock.
2) Turn off the cold water supply to the heater.
3) Turn on the hot water draw-off taps served by the water heater, or, for multiple installations, turn off the hot water outlet connection valve and secondary return valve.
4) Drain down using the drain valve on the heater.

## BURNER ASSEMBLY

STANDARD RANGE

**The burner assembly should be checked and cleaned annually.**

1. Depress catch under the gas control knob and turn to OFF. Remove outer burner cover and slide inner door to right. On L63/71 and L84/74 models, the inner cover must be lifted out.
2. Disconnect pilot tube, thermocouple and main burner supply tube from bottom of control valve. Withdraw burner assembly from heater.
3. Remove screw securing pilot assembly to main burner supply tube.
4. Remove gland nut securing pilot tube to pilot assembly. Withdraw pilot tube and remove pilot restrictor. Clean pilot restrictor with acetone and blow through pilot burner with compressed air.
5. Remove main burner pipe locknut and remove the pipe. Remove main jet and clean with acetone. Blow through main burner with compressed air. **CLEAN ORIFICES WITH WOOD SPLINTER. DO NOT USE SHARP METALLIC OBJECTS.**
6. Re-assemble in reverse order of steps 2 - 5, but note: **DO NOT OVERTIGHTEN THE THERMOCOUPLE CONNECTION. SCREW IN FINGER TIGHT THEN TIGHTEN A FURTHER 1/4 TURN USING A SPANNER.**
7. Turn gas control knob to PILOT and depress. Using leak detection fluid, check joints at both ends of the pilot supply tube. Seal if necessary. **DO NOT EXAMINE WITH A NAKED FLAME.**
8. Allow 3 minutes for unburned gas to disperse. Light the pilot and check flame is correct. (see Section 4, Commissioning). Slide inner door to left (replace on Models L63/71 and L84/74) and turn gas control knob to ON. The main burner will light.
9. Check main burner connection tube at control valve with leak detection fluid and seal if necessary. Replace outer cover.

## BURNER ASSEMBLY
HI-FLO RANGE

**The burner assembly should be checked and cleaned annually.**
NOTE! Models L62/309 and L54/399 are fitted with an anchor bracket between the burner manifold and heater body. Take out 2 screws to remove.

1. Turn gas control valve knob to OFF and disconnect union joint from gas service cock.
2. Disconnect thermostat connections (black, red and white wires) from gas control valve.
3. Remove two screws and slide out burner assembly.
4. Disconnect pilot tube and thermopile connections from gas valve. Remove two screws and withdraw pilot/thermopile assembly.
5. Unscrew two wing nuts and remove draught shield. Remove four screws and disconnect manifold from burner tray.
6. Clean burners by brushing internally and externally and by blowing through with compressed air. Do not remove individual burners from the burner tray.
7. Remove the burner and pilot injectors and clean with acetone. CLEAN ORIFICES WITH WOOD SPLINTER. DO NOT USE SHARP METALLIC OBJECTS.
8. Re-assemble in reverse order but note:
   i) The flueways and combustion chamber must be cleaned first.
   ii) Use an approved jointing compound when re-fitting burner injectors.
9. Light heater in accordance with lighting instructions. All gas joints must be checked using leak detection fluid. Turn off and seal any leakages. DO NOT EXAMINE WITH A NAKED FLAME.
10. Re-light the heater and set the thermostat to the user's requirements.

## GAS CONTROL VALVE
STANDARD RANGE

The gas control valve should be checked and service by a qualified person, fully conversant with this item.

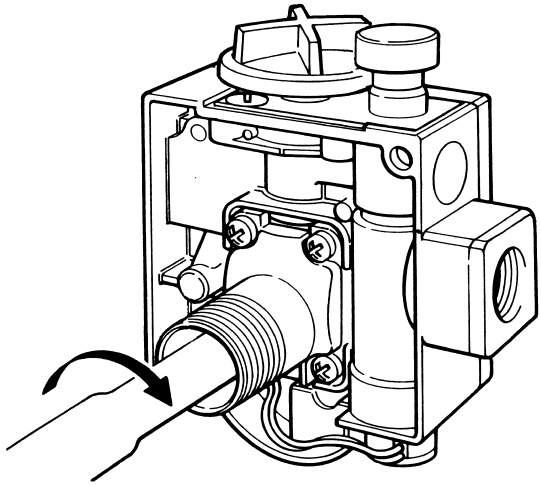

To remove gas control, first drain appliance, disconnect gas pipe union and turn control anti-clockwise, taking care not to damage threads, knobs or the valve itself.

**Fig 27.**

## GAS CONTROL VALVE
HI-FLO RANGE

The gas control valve should be cleaned and checked.
Remove any debris from the valve inlet filter using a soft brush or by blowing with low pressure air.

After servicing, check:-
1. Soundness of any gas joints broken or disturbed and seal any leaks.
2. Burner pressure/gas rate at maximum thermostat setting.
3. Operation of heater is correct. Reset controls to user's requirements.

## FLUE WAYS
STANDARD RANGE

**The flue ways should be checked and cleaned annually.**

1. Depress catch under control knob and turn to OFF. Remove outer burner cover and slide inner door to right. On L63/71 and L84/74 models, the inner cover must be lifted out.
2. Disconnect burner gas tube, pilot tube and thermocouple at gas control.
3. Remove burner assembly complete with pipes and thermocouple lead.
4. Remove split flue clip from flue and lift off draught diverter.
5. Inspect and clean secondary flue installation as necessary.
6. Lift out baffle from inside central flue way. (not Model L84/74)
7. Clean flue way with a brush and remove deposits from underside of storage vessel and from flue baffle.
6. Re-assemble in reverse order. **IT IS IMPORTANT THAT THE BURNER IS CORRECTLY LOCATED IN THE CENTRE OF THE COMBUSTION CHAMBER. DO NOT OVERTIGHTEN THE THERMOCOUPLE CONNECTION. SCREW IN FINGER TIGHT THEN TIGHTEN A FURTHER 1/4 TURN USING A SPANNER.**
7. Re-light heater and carry out relevant commissioning procedures as detailed in Section 4.

## FLUE WAYS
HI-FLO RANGE

**The flue ways should be checked and cleaned annually.**

1. Remove burner as described in Burner Assembly, Hi-Flo Range.
2. Remove the split clamp and raise the flue system to clear the draught diverter socket.
3. Remove securing screws and remove top cover complete with draught diverter and adaptor ring.
4. Remove top insulation and keep safe.
5. Remove flue collector cover.
6. Remove flue baffles and brush flue tube using 75mm diameter brush with minimum length of 1.4m.
7. Remove deposits from tank top and burner compartment. Replace baffles.
8. Re-assemble collector cover, insulation, top cover, flue system and burner assembly.
9. Carry out relevant commissioning procedures as detailed in Section 4.

NOTE! For models L65/169 and L81/251, where top inlet/outlet connections are used, both hot and cold connections must be disconnected before removing the top cover.

## CLEANING THE STORAGE VESSEL
ALL MODELS

**The storage vessel should be checked and cleaned annually.**
Scale formation in the base of the vessel may occur, particularly in hard water areas and is normally associated with high usage and high water temperatures. It is characterised by a rumbling noise when the main burner is lit. Scale formation in the base of the vessel will affect the efficency of the water heater and reduce the life of the storage vessel.
**It should be noted that the failure of the storage heater vessel due to scale formation on the base will not be covered by the terms of the warranty.**
Any scale formation which cannot be removed by normal means of cleaning should be removed by chemical descaling. See below

### DESCALING

When descaling the heater, attention is drawn to the following guidelines.
**CAUTION!**
**DUE TO THE CORROSIVE NATURE OF DESCALING FLUID, IT IS ESSENTIAL THAT SUITABLE PROTECTIVE CLOTHING IS USED AND ADEQUATE VENTILATION AVAILABLE.**

1. Turn gas control to OFF and isolate gas supply.
2. Close water inlet valve and drain heater tank.
3. Remove magnesium anode(s). It is recommended that new anode(s) is(are) fitted.
4. Add suitable hydrochloric acid based descale fluid. The requirement is normally 5 litres for Standard Models and 10 litres for Hi-Flo Models, or more dependant on amount of limescale present.
5. After a minimum of one hour, restore gas supply and turn on main gas burner for 2 minutes maximum.
6. Isolate gas supply and drain descale fluid through drain port.
7. Open cold water feed valve and fill heater tank.
8. Drain and flush out heater for 20 minutes minimum.
9. Replace anode(s).
10. Restore gas supply and re-light heater.

### IMPORTANT!

Remove Correx anode(s) if fitted and plug off the connections using 3/4" BSP plugs. (Hi-Flo models only). Refit the Correx anode(s) when the descaling operation is complete.

## MAGNESIUM ANODE(S)
ALL MODELS

Magnesium sacrificial anode(s) is (are) fitted to the top of the storage vessel.
The anode(s) will prevent corrosion of the storage vessel. Anode condition should be checked annually and replaced if excessive wear is present.

1. Withdraw each anode using a 11/16in AF socket spanner. A new anode measures 21mm diameter.
2. An anode should be replaced, if, at any point along it's length, the diameter is reduced to half, or less of original. Particular attention should be paid to the ends.
3. If the anode is encrusted with limescale, it should be either wire brushed to reveal bright metal or replaced.

**Where Correx™ anodes are fitted, no maintenance is necessary.**

## SAFETY VALVE
HI-FLO RANGE

Check the condition and operation of the safety valve as described below.

**During Servicing**
Examine the safety valve for deposits or let-by. Clean or replace as necessary.

**When Re-Commissioning**
Operate the safety valve, ensuring no let-by when the valve is reset and reseated.

NOTE! For adjustable valves, reduce the rating until the valve operates and gives full flow. Reset the valve and check for let-by. For lever operation valves, operate lever and check for let-by when reseated.

## RESTART
ALL MODELS

Re-light and carry out commissioning checks as detailed in Section 4, Commissioning.
Set the thermostat control to the required user setting.

## GAS CONTROL VALVE

NOTE! Models L62/309 and L54/399 are fitted with an anchor bracket between the burner manifold and the heater body. Remove two screws to release the anchor bracket.

1. Turn gas control knob and gas service cock to OFF.
2. Disconnect pilot feed pipe, thermocouple and thermostat leads from gas valve.
3. Disconnect union joint from gas service cock.
4. Unscrew two wing nuts and remove draught shield. Remove four screw located at each end of the burner manifold and withdraw gas control/burner manifold as a unit.
5. Unscrew the control valve from the burner manifold noting position of the parts.
6. Remove gas service cock union from the control valve.
7. Re-assembly is reverse of above. The joints between the gas cock union and the control valve to burner manifold must be made using an approved jointing compound suitable for natural gas. The gas valve must be fitted so that it is square relative to the centre line of the injectors.
8. Re-commission the heater as detailed in Section 4, Commissioning.

Please note that when replacing the gas control valve on heater models L32/143 & L65/169 a restrictor must be fitted at the bottom of the gas valve inlet thread.

## USER-ADJUSTABLE CONTROL THERMOSTAT WITH LIMIT SENSOR PHIAL AND OVERHEAT ECO

NOTE! These instructions apply to all models but Model L32/143 is not fitted with a limit sensor phial.

1. Turn off the gas control and the service cock.
2. Drain the heater.
3. Remove front cover from control thermostat.
4. Disconnect black, red and white leads and withdraw.
5. Remove phial guard by removing two screws.
6. Remove the clips locating the thermostat capillary.
7. Unscrew gland nut securing limit phial and pull out the phial.
8. Rotate control thermostat/limit phial unit anti-clockwise using a smooth jawed spanner and withdraw.
9. Re-assembly is reverse of above. The joint between control thermostat and tank must be made using an approved jointing compound.
10. Re-commission the heater as detailed in Section 4, Commissioning.

## THERMOPILE/ PILOT BURNER/PILOT RESTRICTOR

1. Turn gas control knob and gas service cock to OFF and disconnect union joint on the gas service cock.
2. Remove two wing nuts and remove front draught shield.
3. Disconnect thermopile and pilot supply pipe from gas control valve.
4. Remove two screws and withdraw burner assembly.
5. Remove two screws and withdraw pilot assembly.
6. Unscrew gland nut securing thermopile to it's bracket and withdraw.
7. Unscrew pilot feed pipe nut and withdraw pipe. The pilot injector will be left in the pilot burner and may be withdrawn by inverting the burner and allowing it to fall out.
8. Re-assemble pilot assembly and connect pilot pipe only to gas control valve with the pilot assembly outside the heater. Turn on gas service cock. Turn gas control to PILOT and press knob, whilst testing pilot connection at gland nut for soundness with leak detection fluid. Seal any leakages and re-test. Turn gas control valve and service cock to OFF.
9. Re-assembly is reverse of steps 2 to 6.
10. All gas joints must be checked for soundness using leak detection fluid. Turn off and seal any leakages. DO NOT EXAMINE WITH A NAKED FLAME.
11. Re-light the heater and set thermostat to user's requirements.

## BURNER

NOTE! Models L62/309 and L54/399 are fitted with an anchor bracket between the burner manifold and the heater body. Remove two screws to release the anchor bracket.

1. Turn off the gas control and the service cock. Disconnect union joint on service cock.
2. Remove two wing nuts and remove front draught shield.
3. Disconnect thermostat connections (black, red and white wires) from gas control valve.
4. Remove two screws and slide out burner assembly.
5. Disconnect pilot tube and thermopile connections from gas valve. Remove two screws and withdraw pilot/thermopile assembly.
6. Remove two screws to remove burner manifold and draught shields.
7. Remove two screws and remove burner fixing bracket.
8. Draw burner forwards to clear it's rear location slot. Replace with new burner.
9. Re-assembly is the reverse of steps 2 to 7.
10. Light the heater in accordance with the lighting instructions. All gas joints must be checked for soundness using leak detection fluid. Turn off and seal any leakages. DO NOT EXAMINE WITH A NAKED FLAME.
11. Re-light the heater and set thermostat to user's requirements.

## AUTO IGNITION UNITS
STANDARD RANGE

| FAULT | ACTION |
|---|---|
| NO IGNITION AT PILOT | (a) Check gas service cock is open.<br>(b) Electrical ON/OFF switch is not ON.<br>(c) Power to unit interrupted.<br>(d) Thermostat set too low.<br>(e) Check ECO for failure. Reset.<br>(f) Check for 24V AC at intermittent pilot ignition control terminal No. 1. Replace control if faulty.<br>(g) Faulty Solenoid Coil. Replace if faulty. |

**PERMANENT PILOT MODELS**
STANDARD AND HI-FLO RANGES

| FAULT | ACTION |
|---|---|
| PILOT LIGHTS BUT MAIN BURNER DOES NOT | (a) Check for 24V AC at intermittent pilot ignition control terminal No. 3. Replace control if faulty.<br>(b) Faulty Solenoid Coil. Replace if faulty. |
| WATER DOES NOT GET HOT | (a) Check gas service cock is open.<br>(b) Check water valves are open<br>(c) Check pilot is alight<br>(d) Check thermostat setting. reset to higher temperature<br>(e) Check gas pressures at burner and at gas inlet to appliance.<br>(f) Standard Range. Check cold dip inlet tube for damage. |
| PILOT FLAME FAILURE | (a) Try to light burner.<br>(b) Pilot will not light. Wait 3 minutes then try again.<br>NOTE: If pilot flame has failed and water is over temperature, ECO has operated. In which case, determine cause of overheating. |
| PILOT WILL NOT STAY ON | (a) Check gas is available<br>(b) Check thermopile and ECO connections. Replace if necessary.<br>(c) Check if inlet gas pressure is too high or too low. Pressure to multifunctional control should be 37 mbar (14.86in WG) Propane 28 mBar (11.26in WG) Butane.<br>(d) Pilot jet blocked. Clean or replace pilot jet.<br>(e) Faulty magnet coil. Replace multifunctional control.<br>(f) ECO safety thermostat operating at too low a temperature. Replace faulty control. |
| BURNER WILL NOT LIGHT PILOT ESTABLISHED | (a) Thermostat setting too low.<br>(b) Gas control knob not set to ON.<br>(c) Check thermostat for failure to close.<br>(d) Check gas control valve. |

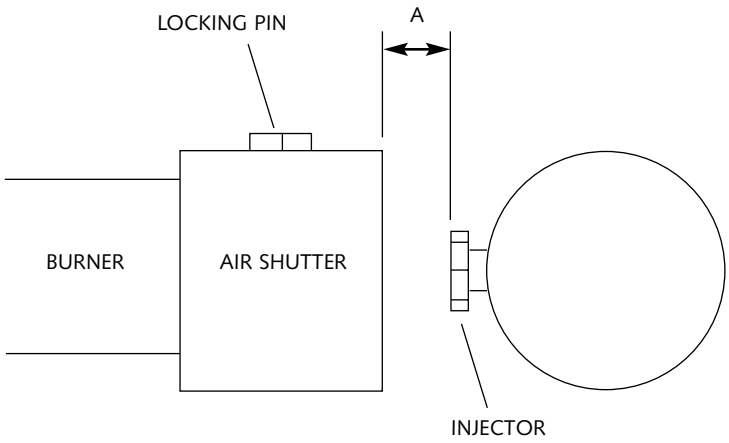
**PERMANENT PILOT MODELS**
STANDARD AND HI-FLO RANGES

| FAULT | ACTION |
|---|---|
| THERMOPILE / THERMOCOUPLE BURNS OUT FREQUENTLY | (a) Check pilot connection for loose joints.<br>(b) Check correct ventilation is available.<br>(c) Check flue is clear and is correctly designed and flue terminal is correctly positioned.<br>(d) Check for presence of halogen compounds. |
| HEATER SOOTING, YELLOW FLAME (POOR COMBUSTION) | (a) Check gas burner pressure and injector size. If possible, check heat input with meter and watch.<br>(b) Clean burners and injectors.<br>(c) Flue obstruction. Clean flue ways.<br>(d) Check flue design and termination position.<br>(e) Check for correct ventilation. |
| WATER TEMPERATURE TOO HIGH | (a) Reset thermostat to lower temperature.<br>(b) Thermostat faulty. Check and replace if necessary.<br>(c) Main gas valve not closing. Clean or replace. |
| WATER TEMPERATURE TOO LOW | (a) Reset thermostat to higher temperature.<br>(b) Check gas pressures at burner and at gas inlet to heater.<br>(c) Thermostat faulty. Check and replace if necessary. |
| NOT ENOUGH HOT WATER | (a) Check gas pressures at burner and at gas inlet to heater.<br>(b) Check amount of water being used against recovery rate given on data plate. If usage too high, more heating capacity needed. |
| WATER DRIPPING FROM BASE OF HEATER | (a) Check if this stops when water in heater is hot. If yes, then condensation is the problem caused by incorrectly designed flue or by tank cooling excessively, i.e. more hot water being used than recovery rate of heater. If so, more heating capacity needed.<br>(b) If water continues to drip when heater is hot, problem is leaking joint or storage vessel. |
| RUMBLING NOISE | (a) Scale formation in heater, consult water treatment specialist. Heater must be descaled and suitable water treatment provided to avoid re-occurrence. |

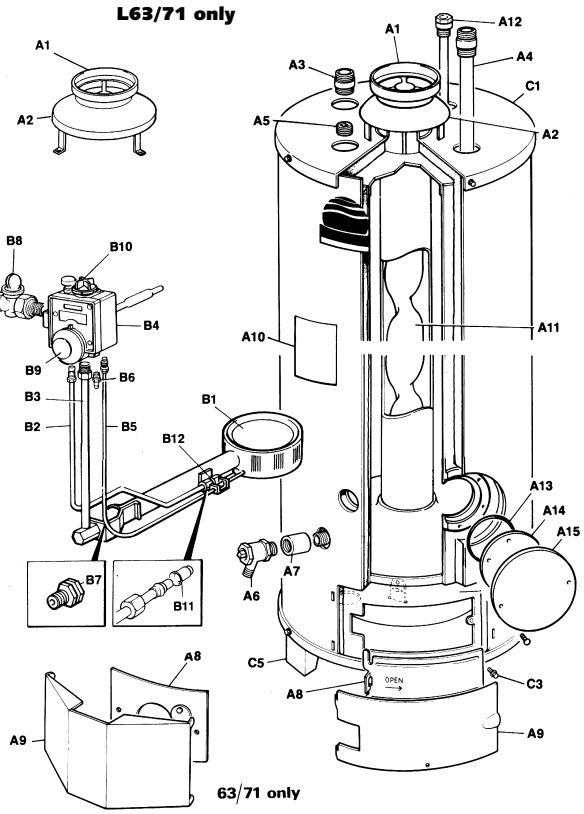
**PERMANENT PILOT MODELS**
HI-FLO RANGES

| FAULT | ACTION |
|---|---|
| LOUD WHISTLING NOISE | Check burner primary air shutter settings are correct to dimensions given below. If not reset to dimensions given below. If the whistling persists continue to reduce the settings until the whistling stops. |

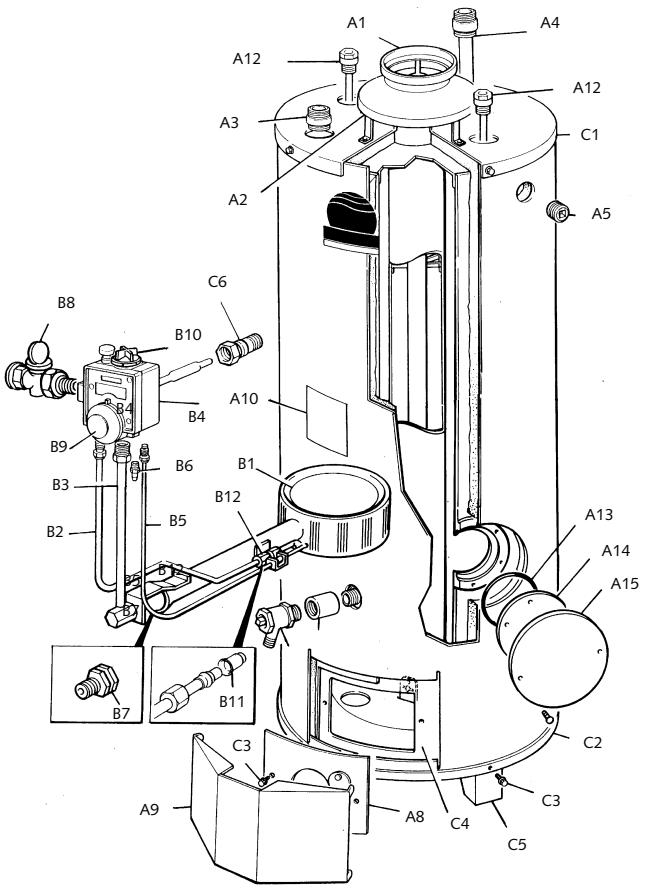
| Heater Model | Air Shutter Dimension A in mm |
|---|---|
| L32/143 | 8 |
| L65/169 | 5 |
| L81/251 | 10 |
| L62/309 | 8 |
| L54/399 | 8 |



**STANDARD Models L24/31, L32/35, L40/36, L63/71**

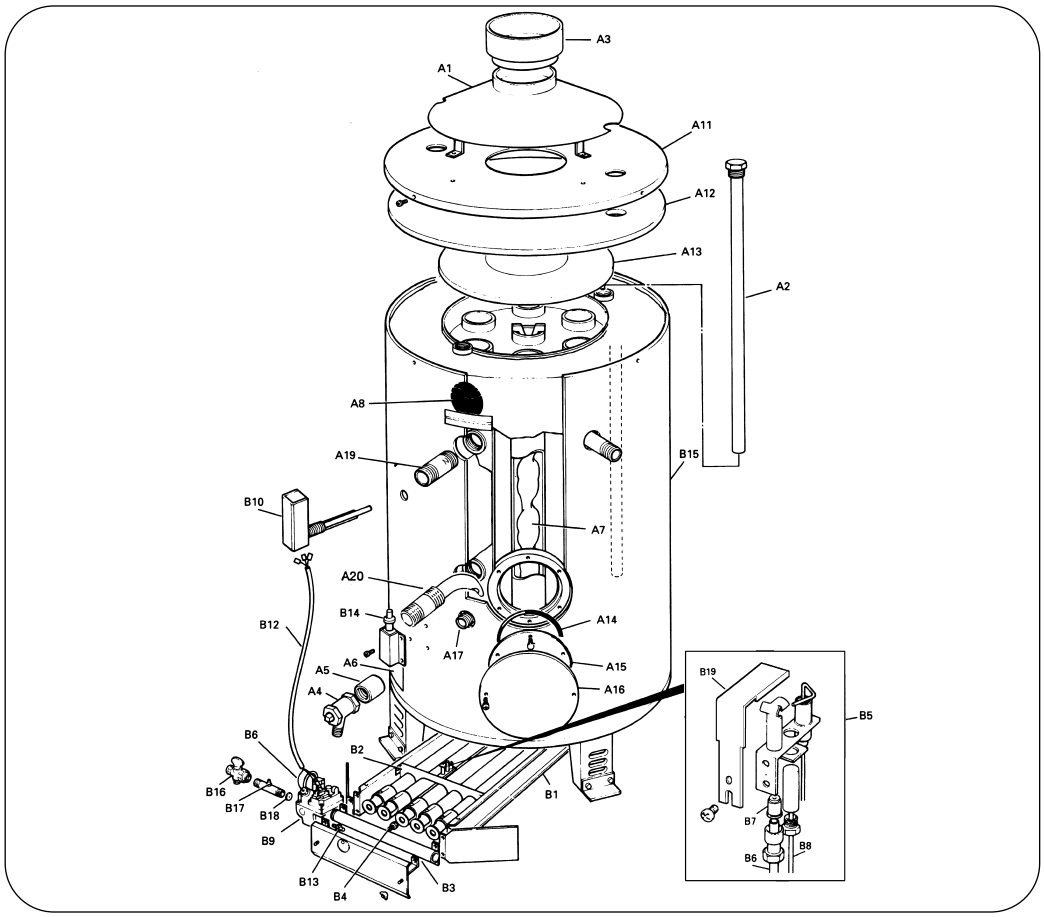



**STANDARD Model L84/74**

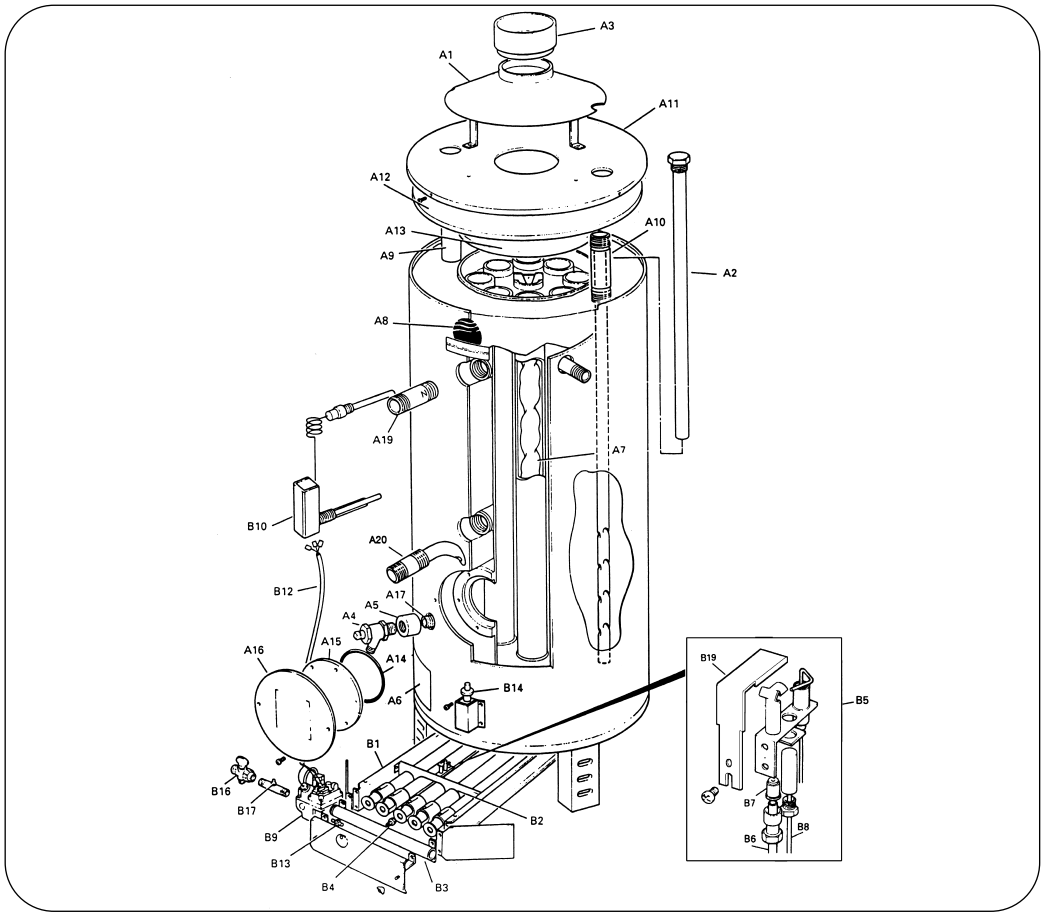


## STANDARD MODELS

| Model Ref. | L24/31 | L32/35 | L40/36 | L63/71 | L84/74 | | |
|---|---|---|---|---|---|---|---|
| | Part Numbers | | | | | Description | Qty |
| A1 | C654 | C654 | C654 | C657 | C657 | Adaptor Ring | 1 |
| A2 | C653 | C653 | C655 | C656 | C658 | Draught Diverter | 1 |
| A3 | C285 | C285 | C285 | C285 | C690 | Hot Outlet Nipple | 1 |
| A4 | C286 | C292 | C293 | C293 | C691 | Cold Inlet Dip Tube | 1 |
| A5 | C641 | C641 | C641 | C641 | C641 | Plug Return Connection | 1 |
| A6 | C381 | C381 | C381 | C381 | C381 | Drain Cock | 1 |
| A7 | C103 | C103 | C103 | C103 | C103 | Socket Coupler 3/4" | 1 |
| A8 | C449 | C449 | C449 | C660 | C660 | Cover, Combustion Chamber | 1 |
| A9 | C450 | C450 | C451 | C329 | C329 | Cover, Burner Access | 1 |
| A10 | C735 | C736 | C737 | C738 | C739 | Data Badge | 1 |
| A11 | C671 | C671 | C672 | C673 | - | Flue Baffle | 1 |
| A12 | C288 | C289 | C290 | C291 | - | Magnesium Anode | 1 |
| A12 | - | - | - | - | C692 | Magnesium Anode | 2 |
| A13 | N/A | N/A | N/A | C299 | C299 | Cleanout Pad Seal | 1 |
| A14 | N/A | N/A | N/A | C300 | C300 | Cleanout Pad | 1 |
| A15 | N/A | N/A | N/A | C301 | C301 | Cleanout Pad Cover | 1 |
| B1 | C815 | C816 | C817 | C818 | C819 | Burner Assy. comprising items B2, B3, B5, B7, B12 | 1 |
| B2 | C405 | C406 | C406 | C407 | C407 | Pilot Supply Pipe | 1 |
| B3 | C828 | C828 | C828 | C829 | C829 | Burner Supply Pipe | 1 |
| B4 | C822 | C822 | C822 | C822 | C822 | Multifunctional Control | 1 |
| B5 | C132 | C132 | C132 | C132 | C132 | Thermocouple | 1 |
| B6 | C136 | C136 | C136 | C136 | C136 | Pressure Test Nipple | 1 |
| B7 | C820 | C821 | C821 | C823 | C823 | Injector | 1 |
| B8 | C382 | C382 | C382 | C382 | C382 | Gas Cock | 1 |
| B9 | C113 | C113 | C113 | C113 | C113 | Knob Thermostat Control | 1 |
| B10 | C114 | C114 | C114 | C114 | C114 | Knob | 1 |
| B11 | C316 | C316 | C316 | C316 | C316 | Pilot Burner Jet Type N11 | 1 |
| B12 | C412 | C412 | C412 | C412 | C412 | Pilot Burner c/w Jet, Pipe | 1 |
| | | | | | | Electrode and Lead | 1 |
| C1 | C464 | C465 | C465 | C466 | C670 | Top Cover Outer Jacket | 1 |
| C2 | C416 | C417 | C417 | C668 | B669 | Base Assy. c/w Radiation Pan | 1 |
| C3 | C689 | C689 | C689 | C689 | C689 | Special Screw | 10 |
| C4 | C661 | C662 | C662 | C663 | C664 | Combustion Chamber | 1 |
| C5 | N/A | N/A | N/A | C689 | C698 | Leg | 3 |
| C6 | N/A | N/A | N/A | N/A | C772 | Gas Control Extension Nipple | 1 |



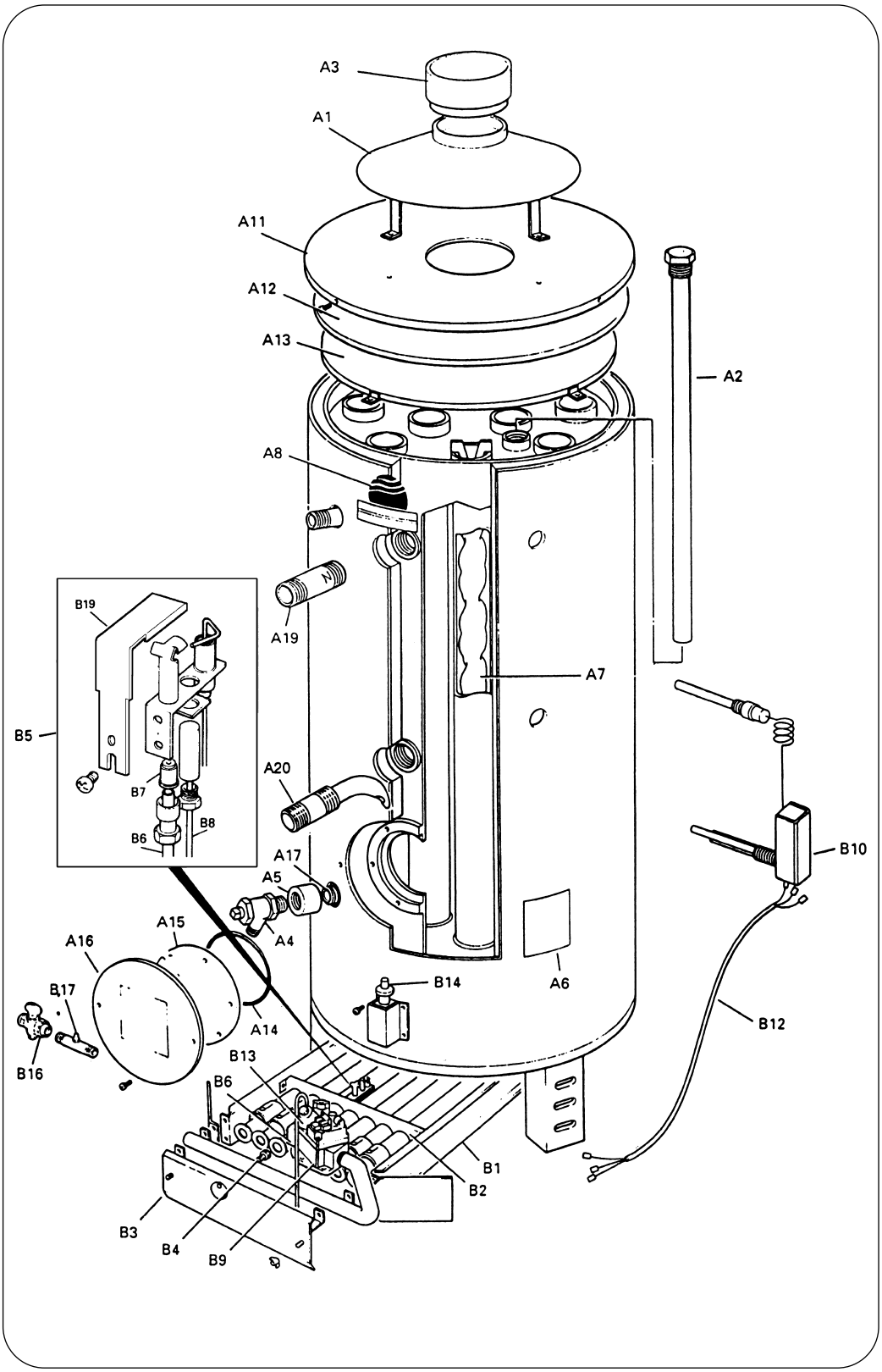

**Hi-Flo Model**
**L32/143**




**Hi-Flo Models**
**L65/169, L81/251**

## HI-FLO MODELS

| Model | L32/143 | L65/169 | L81/251 | | |
|---|---|---|---|---|---|
| Ref. | Part Numbers | | | Description | Qty |
| A1 | E023 | C500 | C501 | Draught Diverter | 1 |
| A2 | C342 | C291 | C553 | Sacrificial Anode | 2 |
| A3 | C334 | C334 | - | Flue Connector, 150mm, BS 835 | 1 |
| A3 | - | - | C432 | Flue Connector, 200mm, BS 835 | 1 |
| A4 | C381 | C381 | C381 | Drain Cock, BS 2879, 3/4" | 1 |
| A5 | C103 | C103 | C103 | Socket Coupler, 3/4" | 1 |
| A6 | E022 | C494 | C495 | Data Badge | 1 |
| A7 | C533 | C536 | C540 | Flue Baffle | 8 |
| A8 | C235 | C235 | C235 | Andrews Label | 1 |
| A9 | N/A | C479 | C479 | Hot Outlet Connection, 1 1/2" BSP | 1 |
| A10 | N/A | E056 | E055 | Hydrojet Cold Inlet Connection (top) 1 1/2" BSP | 1 |
| A11 | C486 | C486 | C486 | Top Cover | 1 |
| A12 | C488 | C488 | C488 | Insulation Pad | 1 |
| A13 | E391 | C489 | C489 | Flue Box Top Cover | 1 |
| A14 | C299 | C299 | C299 | Cleanout Pad Seal | 1 |
| A15 | C300 | C300 | C300 | Cleanout Pad | 1 |
| A16 | C301 | C301 | C301 | Cleanout Pad Cover | 1 |
| A17 | C247 | C247 | C247 | Drain Tapping Connector, 3/4 BSP | 1 |
| A19 | C534 | C534 | C534 | Nipple, 1 1/2 " BSP | 4 |
| A20 | E050 | E050 | E050 | Hydrojet Cold Inlet Connection (side) 1 1/2" BSP | 1 |
| B1 | E032 | C565 | C566 | Burner Assy. comprising items B2 - B6 and B8 - B9 | 1 |
| B2 | C503 | C503 | C503 | Burner Bar | 5 |
| B3 | C505 | C505 | C505 | Burner Manifold | 1 |
| B4 | E 018 | - | - | Injector 1.6mm | 5 |
| B4 | - | C570 | - | Injector 1.7mm | 5 |
| B4 | - | - | C571 | Injector 1.85mm | |
| B5 | C576 | C576 | C576 | Pilot Assy. c/w injector and electrode | 1 |
| B6 | C508 | C508 | C508 | Pilot Supply Pipe | 1 |
| B7 | C316 | C316 | C316 | Pilot Injector | 1 |
| B8 | C552 | C552 | C552 | Thermopile | 1 |
| B9 | C575 | - | - | Multifunctional Valve | 1 |
| B10 | C512 | - | - | Control Thermostat / Overheat ECO | 1 |
| B10 | - | C539 | C539 | Control Thermostat with remote phial and ECO | 1 |
| B12 | C513 | C559 | C559 | Lead Assy. | 1 |
| | | | | Thermostat to Gas Valve | 1 |
| B13 | C136 | C136 | C136 | Pressure Test Nipple | 1 |
| B14 | C514 | C514 | C514 | Piezo Igniter | 1 |
| B16 | C498 | C498 | C498 | Gas Cock 3/4" BSP FxF | 1 |
| B17 | C578 | C578 | C578 | Inlet Nipple 3/4" NPT/3/4" BSP | 1 |
| B18 | C577 | C577 | - | Restrictor, Inlet 4.50mm | 1 |
| B19 | E418 | E418 | E418 | Pilot Shield | 1 |

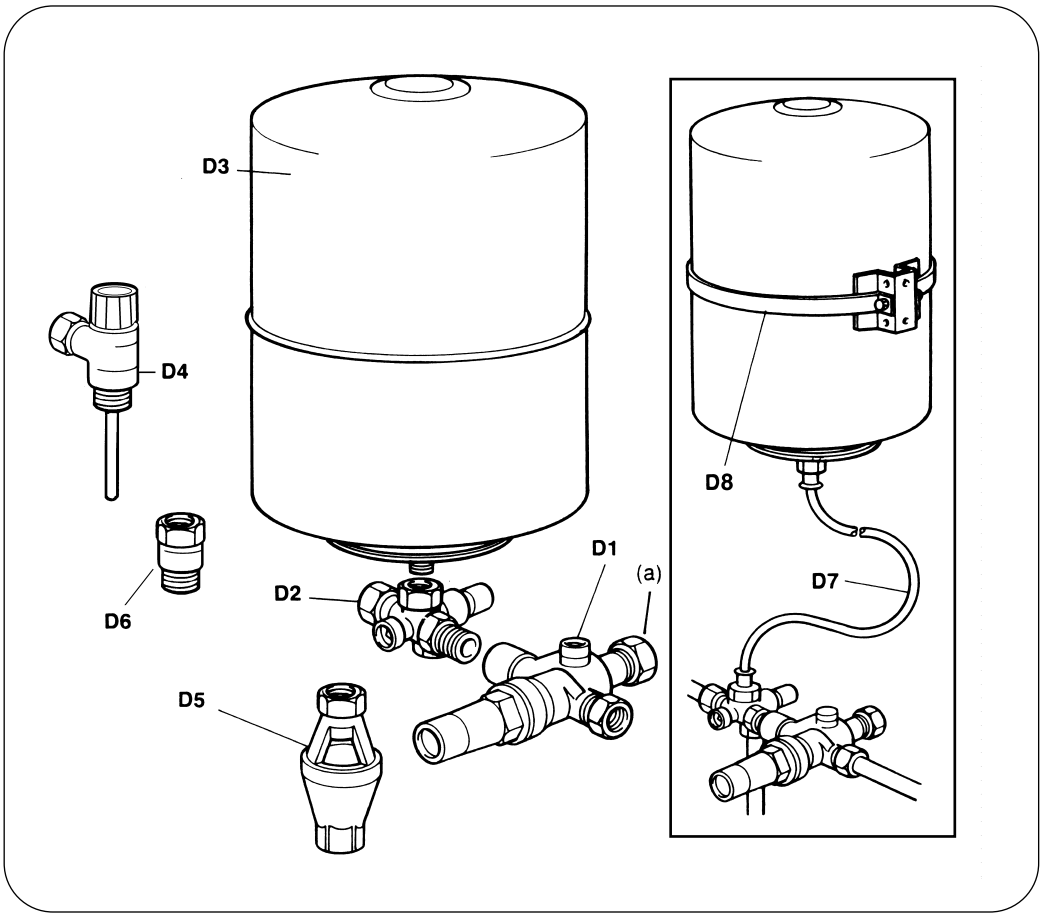



**Hi-Flo Models**
**L62/309, L54/399**

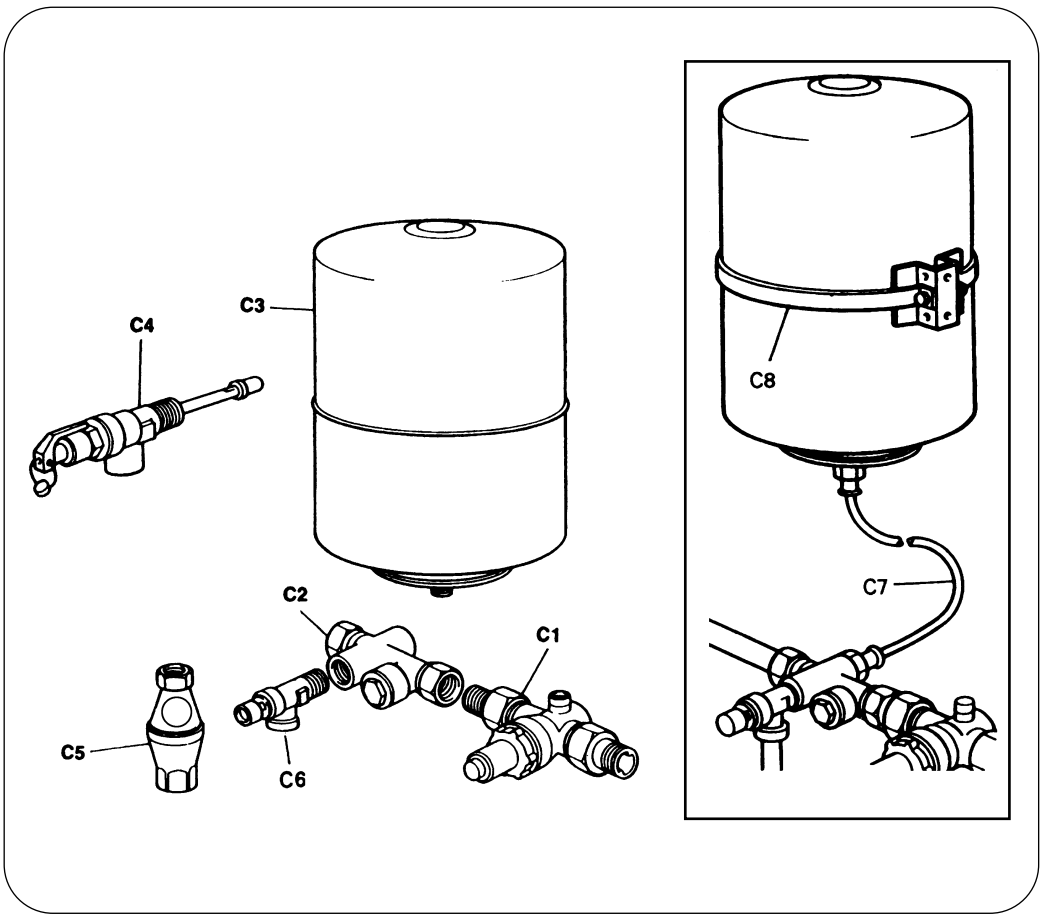
## HI-FLO MODELS

| Model | L62/309 | L54/399 | | |
|---|---|---|---|---|
| Ref. | Part Numbers | | Description | Qty |
| A1 | C501 | C548 | Draught Diverter | 1 |
| A2 | C274 | C274 | Sacrificial Anode | 2 |
| A3 | C432 | - | Flue Connector, 200mm, BS 835 | 1 |
| A3 | - | C335 | Flue Connector, 250mm, BS 835 | 1 |
| A4 | C381 | C381 | Drain Cock, BS 2879, 3/4" | 1 |
| A5 | C103 | C103 | Socket Coupler, 3/4" | 1 |
| A6 | C496 | C497 | Data Badge | 1 |
| A7 | C543 | - | Flue Baffle | 11 |
| | - | C540 | Flue Baffle | 16 |
| A8 | C235 | C235 | Andrews Label | 1 |
| A11 | C487 | C554 | Top Cover | 1 |
| A12 | C488 | C488 | Insulation Pad | 1 |
| A13 | C490 | E392 | Flue Box Top Cover | 1 |
| A14 | C299 | C299 | Cleanout Pad Seal | 1 |
| A15 | C300 | C300 | Cleanout Pad | 1 |
| A16 | C301 | C301 | Cleanout Pad Cove | 1 |
| A17 | C247 | C247 | Drain Tapping Connector, 3/4 BSP | 1 |
| A19 | C534 | C534 | Nipple, 1 1/2 " BSP | 4 |
| A20 | E050 | E050 | Hydrojet Cold Inlet Connection (side) 1 1/2" BSP | 1 |
| B1 | C567 | C568 | Burner Assy. comprising items B2 - B6 and B8 - B9 | 1 |
| B2 | C503 | - | Burner Bar | 7 |
| B2 | - | C503 | Burner Bar | 9 |
| B3 | C545 | C550 | Burner Manifold | 1 |
| B4 | C572 | - | Injector 1.78mm | 7 |
| | - | C572 | Injector 1.78mm | 9 |
| B5 | C576 | C572 | Pilot Assy. c/w injector and electrode | 1 |
| B6 | C547 | C576 | Pilot Supply Pipe | 1 |
| B7 | C316 | C316 | Pilot Injector | 1 |
| B8 | C552 | C552 | Thermopile | 1 |
| B9 | C575 | C575 | Multifunctional Valve | 1 |
| B10 | C539 | C539 | Control Thermostat with remote phial and ECO | 1 |
| B12 | C560 | C560 | Lead Assy. | 1 |
| | | | Thermostat to Gas Valve | 1 |
| B13 | C136 | C136 | Pressure Test Nipple | 1 |
| B14 | C514 | C514 | Piezo Igniter | 1 |
| B16 | C499 | C499 | Gas Cock 3/4" BSP FxF | 1 |
| B17 | C578 | C578 | Inlet Nipple 3/4" NPT/3/4" BSP | 1 |
| B19 | E418 | E418 | Pilot Shield | 1 |

**Unvented Systems Kit - Standard Range**




**Unvented Systems Kit - Hi-Flo Range**



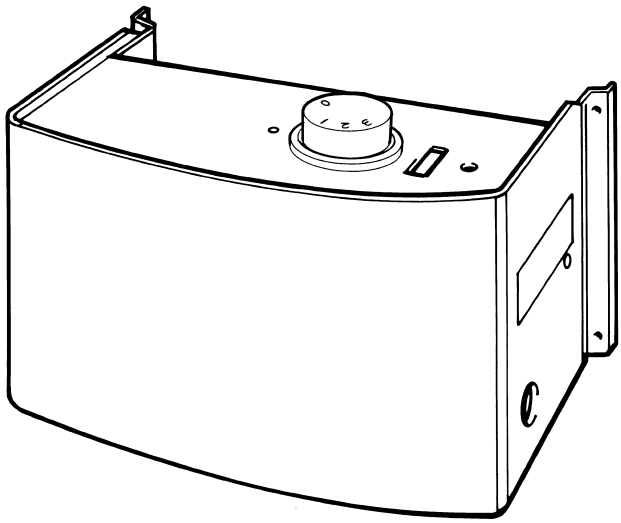
## Unvented Systems Kit - Standard Range

| Ref. | Part No. | Description | Qty |
|---|---|---|---|
| | B171 | Unvented Systems Kit Complete | 1 |
| D1 | C780 | Pressure Reducing Valve/Strainer | 1 |
| D2 | C781 | Check Valve / Expansion Vessel | 1 |
| D3 | C782 | Expansion Vessel | 1 |
| D4 | C456 | Temperature/Pressure Relief Valve | 1 |
| D5 | C783 | Tundish | 1 |
| D6 | C772 | Adaptor | 1 |
| | B173 | Wall Mounting Kit for Expansion Vessel | |
| D7 | C788 | Hose Assembly | 1 |
| D8 | C787 | Wall Bracket Assembly | 1 |

## Unvented Systems Kit - Hi-Flo Range

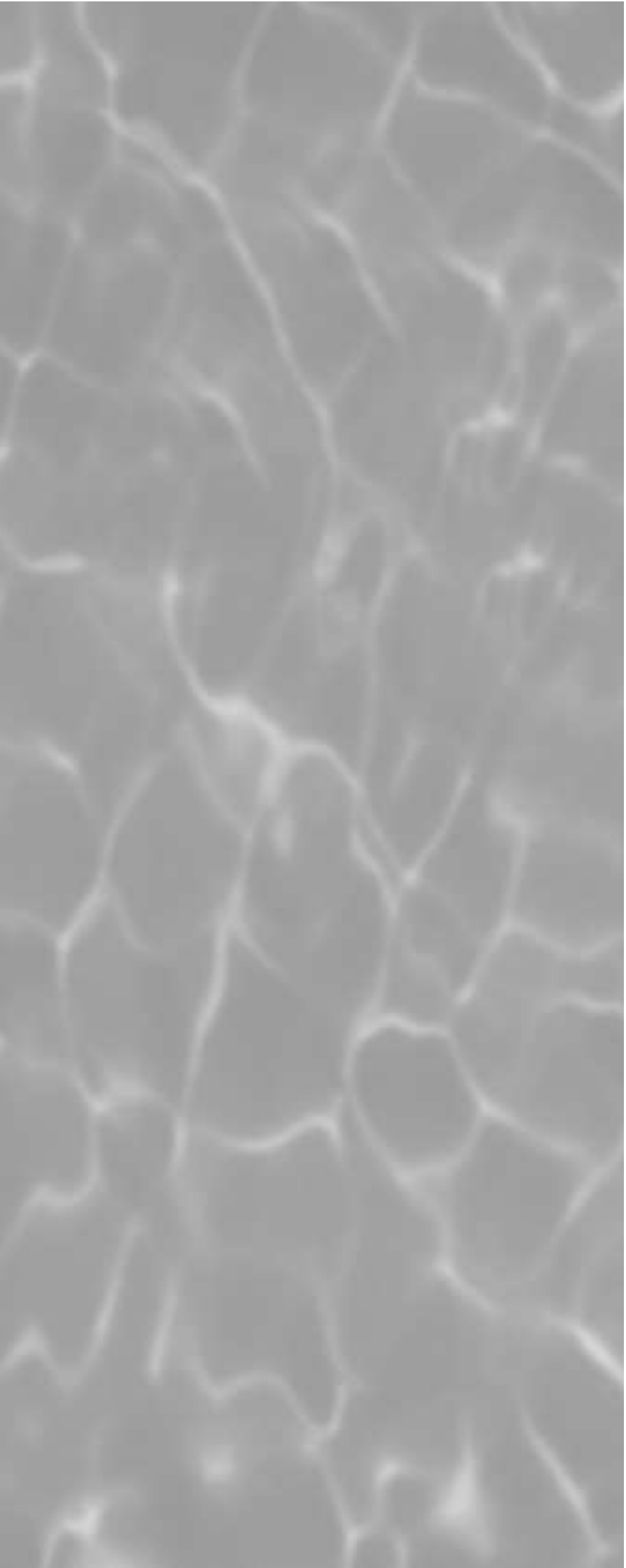
| Ref. | Part No. | Description | Qty |
|---|---|---|---|
| | B172 | Unvented Systems Kit Complete | 1 |
| C1 | C784 | Pressure Reducing Valve/Strainer | 1 |
| C2 | C785 | Check Valve | 1 |
| C3 | C782 | Expansion Vessel | 1 |
| C4 | C380 | Temperature/Pressure Relief Valve | 1 |
| C5 | C384 | Tundish from Temperature/Pressure Valve | 1 |
| C6 | C786 | Expansion Valve | 1 |
| | B173 | Wall Mounting Kit (Optional) | |
| C7 | C788 | Hose Assembly | 1 |
| C8 | C787 | Wall Bracket Assembly | 1 |

**24 Volt Auto System Kit B252 With Timer B253**



## 24 Volt Auto System Kit
Standard Range

| Part No. | Description | Qty |
|---|---|---|
| B252 | 24 Volt Auto System Kit Complete | 1 |
| E113 | Intermittent Pilot Ignition Control | 1 |
| E115 | Transformer | 1 |
| E116 | Limit Thermostat | 1 |
| E117 | Control Thermostat | 1 |
| E120 | Control Thermostat Knob | 1 |
| C521 | On/Off Switch | 1 |
| C641 | Mains Indicator Light | 1 |
| E387 | Gas Valve | 1 |
| E126 | Solenoid Coil | 2 |
| E388 | Pilot Assembly | 1 |
| E128 | Ignition/flame Probe | 1 |
| E135 | HT Lead 24" | 1 |



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10/04